PACKAGING CATALOG

Published by the Packaging Catalog Corporation, 122 East 42nd Street, New York 17, N. Y.; 221 N. La Salle Street, Chicago 1, Ill.; 625 Colorado Bldg., Washington 6, D. C.; 815 Superior Ave., Cleveland 14, Ohio; 427 West 5th Street, Los Angeles 13, Calif.

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1945

ENCYCLOPEDIA OF PACKAGING

Edited and published by the staff of Modern Packaging Magazine.

EDITORIAL PREFACE

The 1945 PACKAGING CATALOG is issued as we face the problems attendant upon returning to civilized, peaceful commercial activity. The transition will not be easy, and much time will elapse before it is completed. The book is designed to help meet those problems. The information it contains will be usable, we believe, whether war's end is right at hand or whether it is months hence.

For most businesses, the change-over means a return to competitive merchandising. Through the war years our nation's thinking has been in terms of survival rather than individual commercial advancement. Package emphasis very properly has been on utility and protection. Those aspects of packaging will not diminish in importance when competitive conditions are restored, but there will be renewed insistence on packages that serve the convenience of consumers and appeal to their desire to buy.

These considerations have dictated the selection of subjects for this edition, as well as the manner of their treatment. The field from which to choose is wider than ever, for not only does packaging cut across every line of business, but recognition of its importance is greater than ever. From the protective aspect more and better packaging is being done; from the merchandising standpoint more and better packaging is being planned. At a time when the paper shortage is at its most critical point, the list of "must" topics is at its peak. Our editorial task involved compression, condensation and in some cases regretful rejection. The present book is the largest in a succession of volumes each larger than its predecessor. Issued in 1929, the first edition contained 56 pages of editorial matter, 67 advertisements and a buyers' directory of 9 pages. In contrast, the 1945 book contains ten times as much editorial material, over 240 advertisements, and a buyers' directory of over 70 pages. As its sphere of usefulness widened, each succeeding volume has manifested the same desire to serve the field that characterized the 1929 edition.

Physically the book does not bulk as large as some of the previous editions—the paper shortage has necessitated the use of lightweight stock. Our readers of course will notice the difference, but we believe they will prefer lighter paper rather than any curtailment of information.

Of particular value, we believe, will be the features in this edition which reflect collective opinion, such as the symposium on package design, the clinic on unsatisfied machinery needs, the round table discussion on materials, and the several articles on merchandising theory and practice. The fact that an occasional clash of ideas may be noted will only add to its stimulative value for the reader.

The chapter, *Legal and Governmental Considerations*, contains much that is new as well as careful revisions of standard subjects. Government controls, no longer a novelty, are represented by a ready reference list of order numbers. *Packaging for Government Orders* is thoroughly but tersely discussed by two government experts. In this chapter, there is also a thoughtful article on patent protection, followed by a review of patents recently granted in the packaging field.

Entirely new as to text and illustrations is the presentation of the set-up box. For the first time in several years, decorative packaging is accorded space commensurate with its importance. For reasons very apparent, that subject during recent issues has been rudely

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pushed to one side. The tremendous enlargement of the use of adhesives and adhesive tapes is recognized by a corresponding increase in material in that chapter. The amazing growth in the use of plastics, as well as the future packaging possibilities for those versatile materials, are fully discussed in articles appearing for the first time.

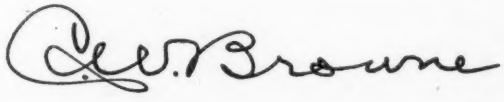
In times like these, when every machinery manufacturer is deeply engrossed in war work, it is fortunate indeed that packaging machines are durable goods. Such new developments as have taken place are described, and many of the new illustrations show equipment in actual operation. Each article dealing with standard types of mechanized packaging has been thoroughly reviewed and brought up to date.

The impacts of war have been keenly felt in the realm of packing for shipment. Many standard practices, therefore, have been up for questioning, making imperative a thorough review and revision of all previous discussions. In addition, new articles will be found on such subjects as veneered packages, marking of shipments, and the packaging of metal parts. One very useful chart shows the properties of packaging materials for government orders, most of which have been developed during the war years.

More than ever before, use has been made throughout the book of charts, tables and diagrams. This compact method of presenting salient facts is of particular value when time is precious and space is at a premium. The preparation of this material enlisted the cooperation of countless firms and individuals to whom we are indebted. Credit has been given whenever possible, but in cases of inadvertent omissions, this mention is offered as an expression of our appreciation. In the list of contributors, more than half the names are new, and the list is the longest yet on record for the PACKAGING CATALOG. The selection of contributors is a matter of very careful thought. In times when every available worker is doing double duty, their willing cooperation is a matter for profound gratefulness.

The growth of this work to encyclopedic proportions makes the question of ready reference a real one. Careful thought, therefore, has been devoted to various devices for making the contents quickly accessible, such as a very complete table of contents by chapters and an elaborately cross-referenced index of subjects, alphabetically arranged. The classification principle used last year in the *Buyers' Directory*, further augmented and expanded, has again been followed. For quick reference to sources of supply, an alphabetical subject index is an added convenience.

In presenting this, the seventeenth edition of PACKAGING CATALOG, we cannot improve on the wording which announced the first volume: "It is our steadfast belief that the increasing growth of the importance of packaging as an economic factor merits an unusually high type of service—a service that will enable users of packages to plan intelligently, economically, and in accordance with the best practices. To the service of the packaging field the book is respectfully dedicated."



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TABLE OF CONTENTS

Charts and tables

Organization of Packaging Department.....55, 56
Tests—Packages and Materials..... 62
Standards for Color Identity.....Opposite 68
Color Effectiveness 71
Government Control Orders (Packaging Material).. 94
Production Statistics of Containers and Closures..... 95
Officials Administering Federal and State Regulations .....Opposite 108
Patent Review 120
Boxboard—Grades—Gauge Lists—Types .....131 ff.
Glossary—Set-up Box Terms 150
Adhesives—Types, Properties, Characteristics...Opposite 356
Coatings:
Chemical Properties 382
Physical Properties 383
Properties of Flexible Packaging Materials.....Opposite 414
Wet-strength Papers—Tests—Properties 431
Properties of Metal Foils and Foil Laminations ..... Opposite 434
Materials for Closure Liners..... 535
Plastics for Packaging—at a Glance.....Opposite 576
Properties of Plastic Sheeting..... 586
Properties of Molded and Cast Plastics Used in Packaging .....Opposite 596
Linings for Metal and Fibre Containers.....780, 782
Packaging Materials for Government Orders....Opposite 794
Requirements for Steel Strapping..... 800
Selling Points for Display Emphasis..... 844

Editorial Preface 2
Authors and Acknowledgments 4
Special Acknowledgment 6
Alphabetical Subject Index..... 9

Rebuilding

Trends in Package Design..... 14
War Lessons which Will Last..... 20
What's Ahead in Materials—a Symposium..... 22
The Place of Research..... 30
Unsatisfied Machinery Needs..... 34
New Shipping Practices and Conditions..... 37
Back to Competitive Markets..... 39
Rebuilding Markets for Packaged Goods..... 43
Back to Tested Merchandising..... 47

Package planning

Package Functions 52
The Packaging Department..... 54
Hazards Encountered by Packages..... 58
Testing Package Materials and Packages..... 59
Consider Production when Designing..... 64
Selecting Package Colors 67
Chart: Standards for Color Identity.....Opposite 68
Preparing Art for Reproduction..... 69
New Developments in Inks..... 73
Methods of Reproducing Designs..... 75
The Artistic Element..... 84
Contract Packaging Service..... 87

Legal and governmental considerations

Government Control of Package Material 94
Packaging for Government Orders..... 96
Special Federal Regulations 101
Progress in Standardization..... 104
How the Department of Commerce Can Help..... 106
Food, Drug and Cosmetic Act..... 107
Chart: Officials Administering Federal and State Regulations ..... Opposite 108
Package and Trademark Protection..... 112
Package and Trademark Trespassing..... 113
Patent Review 120

Cartons and boxes

Research in Paper Production..... 126
Paperboard Products for Packaging..... 128
Boxboard—Types and Selection..... 130
Folding and Display Boxes..... 134
Waxed and Paraffined Cartons..... 144
"Bag in Box" Packages..... 147
Set-up Paper Covered Boxes..... 149
Special Types of Set-up Boxes..... 159
Molded Pulp Packages..... 164
What to Tell Your Box Supplier..... 165

Decorative packaging

Principles of Decorative Packaging..... 214
Fancy Papers for Box Use..... 216
Decorative Films 219
Decorative Foils 221
Decorative Tissue Papers..... 223
Decorative Ribbons, Tapes and Ties..... 225
Decorative and Re-use Boxes..... 226
Gift Wrapping and Packaging Services..... 228

Bags and envelopes

Paper Bags 258
Specialty Flexible Containers..... 261
Transparent Bags 263
Metal Foil Bags..... 266
Merchandise Envelopes and Packets..... 267
Fabric Bags (Unit Containers)..... 268
Textile Bags 269
Heavy Duty Multiwall Bags..... 273
Bag Sealing and Closing..... 278

Labels—Seals—Tags—Marking pieces

Labels—Seals—Tags—Marking Pieces 300
Label Materials and Processes..... 302
Label Statements—Required and Optional..... 307
Label Space as Advertising..... 316

XUM

Adhesives and adhesive tapes

Technical Aspects of Adhesives 332
New Developments in Adhesives 341
Resin Adhesives 342
Equipment for Applying Adhesives 344
Heat-sealing Principles 348
Adhesives for Heat Sealing 354
What to Tell Your Adhesive Supplier 355
Adhesives for Weatherproof Cases 356
Chart: Adhesives—Types, Properties, Characteristics
Opposite 356
Types of Gummed Tape 357
Pressure-sensitive Tape 358
Tacky-tape Dispensers and Affixers 360

Coatings

What to Expect from Coatings 376
Technical Aspects of Resinous Coatings 378
Paper Coatings 384
Coating Impervious Papers 386
Developments in Waxes 388
Uses of Asphalt 395
Lacquers in Packaging 399
Cautions in Applying Lacquers 401
Plastic and Resinous Coatings 402
Applying Thermoplastic Coatings 404

Wrappings and laminations

Flexible Packaging Materials 412
Chart: Properties of Flexible Packaging Materials
Opposite 414
Printed Transparent Sheeting 415
Glassines 419
Vegetable Parchments 423
Waxed Papers 427
Wet-strength Papers 430
Metal Foils, Technical Aspects 432
Chart: Properties of Metal Foils and Foil Laminations
Opposite 434
Technicalities of Laminated Structures 435

Cans and tubes

Metal Cans 478
Bonderite Coating for Metal Cans 481
Future of Electrolytic Tinplate 483
Handling Cans on the Production Line 485
Can Decorating 487
Fibre-bodied Cans and Tubes 489
Paper Cups and Cans 492
Collapsible Metal Tubes 494
Coatings for Collapsible Tubes 496

Glass—Pottery—Closures

The Glass Package Today 516
Handling Glass on the Production Line 519
Standardization of Glass Containers 522
Handmade Glass Bottles 525
Tumblers as Packages 527
Specialized Glass Containers 528
Closures—Finishes—Liners—Seals 531
Pictorial Review of Closures 536
Pottery Containers 543
Merchandising the Glass Package 545

Plastics

Basic Considerations 574
Plastic Materials Used in Packages 575
Chart: Plastics for Packaging at a Glance ..... Opposite 576
Manufacturing Methods 579
Molded Containers 582
Fabricated Containers 584
Semi-rigid Seamless Vials 588
Plastic Closures 589
Design Suggestions for Molded Parts 592
Printing on Plastics 594
Stock Molds 596
Chart: Properties of Molded and Cast Pastics Used in Packaging ..... Opposite 596
Plastic Strip Coating 597
Trends to Watch 598

Machinery and equipment

Mechanization Principles 630
Principles of Plant Layout 632
Weighing and Filling Dry Products 635
Check-weighing Scales and Devices 639
Bottle Cleaning Equipment 641
Filling Liquids and Pastes 644
Capping and Sealing Equipment 647
Labeling Machines and Devices 651
Wrapping Equipment 654
Tight-wrapping Equipment 660
Heat-sealing Equipment 662
Carton Loading and Closing Equipment 667
Collapsible Tube Filling 669
Bag Filling and Sealing 671
Inspection on the Production Line 673
Box and Bag Stapling Equipment 675
Case Packing and Sealing Equipment 677
Wire-stitching Machinery 678
Materials-handling Equipment 680
Graphic Arts Equipment 684
Coating and Embossing Equipment 688
Laminating Equipment and Methods 689
Maintenance Problems 693

Packing for shipment

Standard Shipping Practices 760
Corrugated and Fibre Shipping Boxes 767
Steel Barrels and Drums 771
Fibre Drums 775
Linings for Metal and Fibre Drums 779
Wood Barrels and Drums 783
Wood Boxes 784
Veneered Packages 786
Carboys for Shipping 788
Prepacking for Convenience 789
Packaging of Metal Parts 791
Chart: Packaging Materials for Government Orders ..... Opposite 794
Steel and Fibre Strapping 797
Equipment for Applying Tape 801
Protective Pads and Cushions 805
Flexible Corrugated for Protection 807
Marking Shipments 809
Shipment of Freight by Air 813
Packing for Export 816

Merchandising

Display as a Merchandising Force 838
New Structures for Paper Displays 840
The Dealer Factor in Displays 842
Jobs which Displays Can Do 844
Measuring Display Circulation 846
Relating Displays to Other Media 848
Fitting Displays to the Sales Spot 851
Preparatory Work 856
Wood Displays and Cabinets 859
Displays will be Lighted Again 861
Corrugated Display Materials 863
Crepe Paper for Displays 865
Plus Values of the Corrugated Box 867
Display in the Store 869

Indexes—Directories

Buyers' Directory 882
Subject Index—Alphabetical (Products, etc.) 882
Materials and Supplies Section 885
Container Manufacturers Section 901
Machinery and Equipment 913
Services Section 920
Directory of Trade Names 926
Alphabetical List of Manufacturers and Addresses 945
Advertisers' Index 956

ALPHABETICAL SUBJECT INDEX

Adhesives—Causes of Failure..... 334
Adhesives, Equipment for Applying 344
Adhesives for Heat Sealing 354
Adhesives for Tight Wraps..... 661
Adhesives for Weatherproof Cases 356
Adhesives, New Developments in.. 341
Adhesives, Resin 342
Adhesives Supplier, What to Tell Your 355
Adhesives, Technical Aspects of.. 332
Adhesives, Types, Properties, Characteristics of (Chart)..Opposite 356
Advertisers' Index 956
Advertising, Label Space as..... 316
Air Cleaning (Bottles)..... 641
Air Shipment of Freight..... 813
Ampuls 528
Ampul Washers 643
Aniline Printing of Transparent Sheeting 417
Applicator Closures 540
Applied Color (on Plastics)..... 594
Applying Adhesives, Equipment for 344
Applying Lacquers, Cautions in... 401
Applying Tape, Equipment for.... 801
Applying Thermoplastic Coatings.. 404
Art Work for Reproduction, Preparing 69
Artistic Element, The..... 84
Asphalt, Uses of..... 395

•

Background Materials (Displays) 863, 865
Back to Competitive Markets..... 39
Back to Tested Merchandising.... 47
Bag and Box Stapling Equipment.. 675
Bag Filling and Sealing..... 671
"Bag in Box" Packages..... 147
Bags, Fabric (Unit Containers)... 268
Bags, Heavy Duty Multiwall..... 273
Bags, Metal Foil 266
Bags, Paper 258
Bag Sealing and Closing..... 278
Bags, Textile 269
Bags, Transparent 263
Baked Goods, Wrapping Machines for 655
Band Type Metal Closures..... 537
Barrels and Drums, Steel..... 771
Barrels and Drums, Wood..... 783
Basic Considerations (Plastics)... 574
Baskets, Hampers, Crates (Veneered) 786
Board, Paper (for Boxes)..... 130
Bonderite Coating for Metal Cans.. 481
Bottle Cleaning Equipment..... 641
Bottles, Handmade Glass..... 525
Box and Bag Stapling Equipment.. 675
Boxboard, Grades, Gauge Lists, Types of 130
Boxboard, Types and Selection of 130
Boxes, Folding and Display..... 134
Box Supplier, What to Tell Your 165
Box Use, Fancy Papers for..... 216
Boxes, Wood..... 784
Brand Name, Importance of..... 45
Burlap Bags 269
Buyers' Directory 882

•

Cabinets and Displays (Wood)... 859
Can Decorating 487
Cans and Cups, Paper 492
Cans and Tubes, Fibre-bodied..... 489
Cans, Metal 478
Capping and Sealing Equipment... 647
Carboys for Shipping..... 788
Care and Lubrication (Machinery) 693
Carton Loading and Closing Equipment 667
Cartons, Waxed and Paraffined.... 144
Case Packing and Sealing Equipment 677
Cast and Molded Plastics, Properties of (Chart).....Opposite 596
Cautions in Applying Lacquers.... 401
Cellophane Bags 263
Cellophane in Decorative Packaging 219
Cellulose Acetate Film 413
Ceramic Closures 542
Ceramic Containers 543
Check-weighing Scales and Devices 639
Circulation, Measuring Display.... 846
Cleaning Equipment, Bottle..... 641
Closing and Loading Cartons (Equipment) 667
Closing and Sealing of Bags..... 278
Closure Liners 541
Closures, Finishes, Liners, Seals... 531
Closures, Pictorial Review of..... 536
Closures, Plastic 589
Cloth Bags (Unit Containers).... 268
Coating and Embossing Equipment 688
Coating (Bonderite) for Metal Cans 481
Coating Impervious Papers..... 386
Coating, Strip (Plastic)..... 597
Coatings, Applying Thermoplastic 404
Coatings for Collapsible Tubes.... 496
Coatings, Paper 384
Coatings, Plastic and Resinous.... 402
Coatings (Resinous), Technical Aspects of 378
Coatings, Wax 388
Coatings, What to Expect from.... 376
Collapsible Metal Tubes..... 494
Collapsible Tube Filling..... 669
Collapsible Tubes, Coatings for.... 496
Color Identity, Standards for (Chart) .....Opposite 68
Color in Package Design..... 14
Colors, Selecting Package..... 67
Commerce—How the Department Can Help 106
Competitive Markets, Back to.... 39
Compression Molding Materials.. 575
Consider Production when Designing 64
Constant Level Fillers..... 645
Construction of Folding Boxes.. 134
Construction, Paper Bags..... 258
Construction, Set-up Boxes..... 150
Container Manufacturers' Section, Buyers' Directory 901
Containers, Liquid-tight Paper.... 492
Containers, Specialty Flexible.... 261
Containers, Specialized Glass..... 528
Containers (Glass), Standardization of 522
Contract Packaging Service..... 87
Control of Package Materials, Government 94
Conveyors 680
Convolutely-wound Fibre Cans.... 491
Cooperage (Barrels) 783
Copy in Package Design..... 15
Copyright Registration 112
Cork Closures 538
Corrosion Prevention (Machinery) 693
Corrugated and Fibre Shipping Boxes 767
Corrugated Box, Plus Values of.. 867
Corrugated Cases (Prepacking)... 789
Corrugated Display Materials..... 863
Corrugated (Flexible) for Protection 807
Cosmetic, Food and Drug Act.... 107
Cosmetic Labeling, Legal Provisions 110, 307
Cosmetics, Packaging Materials Forecast 25
Cotton Bags 269
Counter Displays 853
Coverage, Window Display..... 846
Coverings for Fancy Boxes (Paper) 216
Crates, Hampers, Baskets (Veneered) 786
Crating 785
Crepe Paper for Displays..... 865
Crown and Cork Capping..... 649
Crown and Lock Metal Closures.. 538
Cups and Cans, Paper..... 492
Cushioning (Shipments) 768
Cushions and Pads, Protective.... 805
Custom Packaging 87

•

Dealer Factor in Displays, The.... 842
Decalcomania Transfers..... 305
Decorating of Metal Cans..... 487
Decorative and Re-use Boxes..... 226
Decorative Coatings for Paper.... 384
Decorative Films 219
Decorative Foils 221
Decorative Packaging, Principles of 214
Decorative Ribbons, Tapes and Ties 225
Decorative Tissue Papers..... 223
Department of Commerce—How It Can Help 106
Department Store, Display Practice 871
Design Suggestions for Molded Parts (Plastic) 592
Design, Trends in 14
Design Trends, Influences on..... 19
Designing, Production Considerations in 64

XUM

Designs, Methods of Reproducing.. 75
Developments in Waxes..... 388
Developments—New in Inks..... 73
Devices and Scales for Check Weighing 639
Directory of Trade Names..... 926
Dispensers and Affixers, Tacky-tape 360
Display and Folding Boxes..... 134
Display as a Merchandising Force 838
Display Circulation, Measuring.... 846
Display in the Store..... 869
Display Materials, Corrugated.... 863
Displays and Cabinets (Wood).... 859
Displays, Backgrounds for....863, 865
Displays, Counter 853
Displays, Crepe Paper for..... 865
Displays—Fitting to the Sales Spot 851
Displays, Floor and Wall (Lithographed) 852
Displays—Jobs Which They Can Do 844
Displays, New Structures for (Paper) 840
Displays, Preparatory Work (Lithographed) 856
Displays, Relating to other Media 848
Displays, The Dealer Factor in.... 842
Displays Will Be Lighted Again.. 861
Drawn Boxes (Set-up)..... 162
Drawn Containers (Plastics)..... 584
Drug, Food and Cosmetic Act.... 107
Drug Labeling, Legal Provisions.. 109
Drugs—Packaging Materials Forecast 24
Drums and Barrels, Steel..... 771
Drums and Barrels, Wood..... 783
Drums, Fibre 775
Dry Products, Weighing and Filling 635

•

Electrolytic Tinplate, Future of.. 483
Electronic Heat Sealing..... 666
Embossing and Coating Equipment 688
Emphasis of Features in Package Design 18
Enforcement—Food, Drug and Cosmetic Act 111
Envelopes and Packets, Merchandise 267
Equipment and Machinery—Buyers' Directory 913
Equipment for Applying Adhesives 344
Equipment for Applying Tape.... 801
Ethyl Cellulose Film..... 413
Export, Packing for..... 816
Extrusion Molding Materials..... 576

•

Fabricated Containers (Plastic)... 584
Fabric Bags (Unit Containers).... 268
Fancy Papers for Box Use..... 216
Features to be Emphasized in Package Design 18
Federal and State Regulations, Officials Administering (Chart) ..... Opposite 108
Federal Regulations, Special..... 101
Fibre and Corrugated Shipping Boxes 767
Fibre and Metal Drum Linings.. 779
Fibre and Steel Strapping..... 797
Fibre-bodied Cans and Tubes.... 489
Fibre Drums 775
Filling and Sealing Bags (Equipment) 671
Filling and Weighing Dry Products 635
Filling Liquids and Pastes..... 644
Films, Decorative 219
Finishes, Liners, Seals for Closures 531
Fitted Boxes (Set-up)..... 160
Fitting Displays to the Sales Spot 851
Flexible Containers, Specialty..... 261
Flexible Corrugated for Protection 807
Flexible Packaging Materials..... 412
Flexible Packaging Materials, Properties of (Chart)..Opposite 414
Floor and Wall Displays, Lithographed 852
Foils and Foil Laminations, Properties of (Chart).....Opposite 434
Foil Bags, Metal 266
Foils, Decorative 221
Foils (Metal), Technical Aspects of 432
Folding and Display Boxes..... 134
Folding and Display Boxes, Pictorial Review of..... 135
Food, Drug and Cosmetic Act.... 107
Food Labeling, Legal Provisions 108, 307
Food Products—Packaging Materials Forecast 22
Foreign Market, The (Postwar).. 46
Forest Products Laboratory..... 127
Freight by Air, Shipment of..... 813
Functional Coatings for Paper.... 384
Functions, Package 52
Future of Electrolytic Tinplate.... 483

•

Gauge Lists (Boxboard)..... 131
Gift Wrapping and Packaging Services 228
Glass Bottles, Handmade..... 525
Glass Containers, Specialized..... 528
Glass Containers, Standardization of 522
Glass Closures 540
Glass—Handling on the Production Line 519
Glassine Bags 264
Glassines 419
Glass Package, Merchandising the 545
Glass Package Today, The..... 516
Glossary—Set-up Box Terms..... 150
Government Control of Package Materials 94
Government Orders, Packaging for 96
Government Orders, Packaging Materials for (Chart).....Opposite 794
Government Restrictions (Steel Drums) 771
Grade Labeling 313
Graphic Arts Equipment 684
Gravure Equipment 686
Gravure Printing of Transparent Sheeting 416
Gravure Process 78
Gummed Tape, Types of..... 357

•

Hampers, Crates, Baskets (Veneered) 786
Hand-capping Machines 647
Handling Cans on the Production Line 485
Handling Glass on the Production Line 519
Handmade Glass Bottles..... 525
Hazards Encountered by Packages 58
Heat Sealing, Adhesives for..... 354
Heat-sealing Agents 348, 663
Heat Sealing, Electronic..... 666
Heat-sealing Equipment 662
Heat-sealing Principles 348
Heavy Duty Multiwall Bags..... 273
Hot Melt Laminants..... 690
How the Department of Commerce Can Help 106

•

Identity, Standards for Color (Chart) ..... Opposite 68
Illuminated Displays 861
Illustration in Package Design.... 18
Impervious Papers—Coatings for.. 386
Informative Labeling 314
Influences on Design Trends..... 19
Inks, New Developments in..... 73
Inspection on the Production Line 673
Institute of Paper Chemistry..... 127
Irregular Objects, Wrapping..... 656

•

Jobs Which Displays Can Do.... 844

•

Labeling Machines and Devices.. 651
Labeling Laws 107, 308
Labeling of Wool Products..... 103
Label Materials and Processes.... 302
Labels, Seals, Tags, Marking Pieces 300
Label Space as Advertising..... 316
Label Statements, Required and Optional 307
Lacquers, Cautions in Applying... 401
Lacquers in Packaging..... 399
Laminated Structures, Technicalities of 435
Laminating Adhesives, Thermoplastic 406
Laminating Equipment and Methods 689
Laminations (Foil), Properties of (Chart) ..... Opposite 434
Law—Food, Drug and Cosmetic... 107
Layout (Plant) Principles..... 632
Lessons (War) Which Will Last.. 20
Letterpress Equipment 685
Letterpress Printing 75
Letterpress Printing of Transparent Sheeting 416
Loading and Closing Cartons (Equipment) 667
Lighted Displays 861

Liners, Seals, Finishes for Closures 531
Linings for Metal Containers and Fibre Drums 779
Liquid-tight Paper Containers..... 492
Liquids and Pastes, Filling..... 644
Liquor Packages and Labels..... 101
Lithographed Displays, Preparatory Work 856
Lithographed Window Displays.... 852
Lithographic Equipment 686
Lithographic Process 77
Lithographing of Metal Cans..... 487
Lubrication and Care of Machinery 693
Lug Type Metal Closures..... 537

Machinery and Equipment—Buyers' Directory 913
Machines and Devices, Labeling.. 651
Machinery Needs, Unsatisfied..... 34
Mailing Boxes (Set-up)..... 159
Maintenance Problems 693
Mandatory Label Statements..108, 309
Manufacturers and Addresses—Alphabetical List 945
Manufacturing Methods (Plastics) 579
Marketing Changes 49
Markets, Back to Competitive.... 39
Markets for Packaged Goods, Rebuilding 43
Marking Pieces, Seals, Tags, Labels 300
Marking Shipments 809
Materials and Package Testing.... 59
Materials and Processes, Label... 302
Materials and Supplies Section—Buyers' Directory 885
Materials, Flexible Packaging.... 412
Materials-handling Equipment.... 680
Materials, What's Ahead in..... 22
Measuring Display Circulation.... 846
Mechanization Principles 630
Merchandise Envelopes and Packets 267
Merchandising, Back to Tested.... 47
Merchandising Force, Display as a 838
Merchandising the Glass Package.. 545
Metal and Fibre Drum Linings.... 779
Metal Cans 478
Metal Edge Boxes (Set-up)..... 159
Metal Foil Bags..... 266
Metal Foils and Foil Laminations, Properties of (Chart)..Opposite 434
Metal Foils, Technical Aspects of 432
Metal Parts, Packaging of.....96, 791
Metering Machines (Liquid Filling) 644
Method I, I-A, etc. (Metal Packaging) 96, 791
Methods of Reproducing Designs.. 75
Miniature Glass Containers..... 528
Molded and Cast Plastics, Properties of (Chart).....Opposite 596
Molded Containers (Plastic)..... 582
Molded Parts (Plastic), Design Suggestions for..... 592
Molded Pulp Packages..... 164
Molding Methods (Plastics)..... 579
Molds, Stock (Plastic)..... 596
Mullen Test, Vegetable Parchment 424
Multiwall Bags, Heavy Duty..... 273
"M.V.T." Test 61, 62

New Developments in Adhesives... 341
New Developments in Inks..... 73
New Shipping Practices and Conditions 37
New Structures for Paper Displays. 840

Officials Administering Federal and State Regulations (Chart) Opposite 108

Offset Lithography Equipment.... 686
Offset Lithography..... 77
Open Mesh Bags..... 272
Optional and Required Statements on Labels 307
Orders, Government, for Packaging 96
Organizing a Package Department. 54
Origin of Labeling..... 300
Outage Detectors, Volume..... 640

Package and Trademark Protection 112
Package and Trademark Trespassing 113
Package Colors, Selecting..... 67
Package Design, Trends in..... 14
Packaged Goods, Rebuilding Markets for..... 43
Package Functions..... 52
Package Hazards..... 58
Package Materials, Government Control of..... 94
Packaging Department, The..... 54
Packaging for Government Orders. 96
Packaging Laboratory, The..... 55
Packaging Materials, Flexible..... 412
Packaging Materials for Government Orders (Chart)...Opposite 794
Packaging of Metal Parts.....96, 791
Packaging Service, Contract..... 87
Packaging Services, Gift Wrapping 228
Packets and Envelopes, Merchandise 267
Packing and Sealing Equipment—Cases 677
Packing for Export..... 816
Pads and Cushions, Protective.... 805
Paper Bags 258
Paperboard (for Boxes)..... 130
Paperboard Products for Packaging 128
Paper Coatings 384
Papers, Coating Impervious..... 386
Paper Containers, Liquid-tight.... 492
Paper Covered Boxes, Set-up.... 149
Paper Cups and Cans..... 492
Paper Production, Research in.... 126
Paper Products (Films)..... 415
Paraffined and Waxed Cartons.... 144
Parchments, Vegetable 423
Partitioned Boxes (Set-up)..... 161
Pastes and Liquids, Filling..... 644
Patent Misconceptions 115
Patent Review 120
Pharmaceuticals—Packaging Materials Forecast 24
Phosphorous Coating (Bonderite). 481
Photographic Supplies—Packaging Materials Forecast 27
Pictorial Review of Closures..... 536
Pictorial Review, Folding and Display Boxes 135
Pictorial Review, Set-up Boxes.... 153
Place of Research, The..... 30
Plant Layout, Principles of..... 632
Plastic and Resinous Coatings.... 402
Plastic Closures 589
Plastic Fabricated Containers..... 584
Plastic Materials Used in Packages 575
Plastic Molded Containers..... 582
Plastics—Basic Considerations..... 574
Plastics for Packaging at a Glance (Chart) ..... Opposite 576
Plastics—Manufacturing Methods.. 579
Plastics (Molded and Cast), Properties of (Chart).....Opposite 596
Plastic Molded Parts, Design Suggestions for 592
Plastics, Printing on 594
Plastic Stock Molds 596
Plastic Strip Coating 597
Plastic Trends to Watch 598
Plus Values of the Corrugated Box 867
Plywood Boxes 785
Point of Purchase Advertising Institute 851
Polyethylene Films 414
Polyvinyl Alcohol Films..... 414
Postal Department Regulations.... 101
Pottery Containers 543
Pre-fabricated "Bottles" 492
Prepacking for Convenience 789
Preparatory Work (Lithographed Displays) 856
Preparing Art for Reproduction.. 69
Pressure Factor (Heat Sealing).. 351
Pressure-sensitive Tape 358
Pressure-sensitive Tape, Equipment for Applying 360
Principles of Decorative Packaging 214
Principles of Heat Sealing..... 348
Principles of Mechanization..... 630
Principles of Plant Layout..... 632
Printed Transparent Sheeting..... 415
Printing Equipment 684
Printing on Plastics 594
Printing Processes 75
Processes and Materials, Labels.. 302
Production Considerations, Designing 64
Production Line, Handling Cans on the 485
Production Line, Handling Glass on the 519
Production Line, Inspection on the 673
Progress in Standardization..... 104
Properties, Characteristics, Types of Adhesives (Chart)..Opposite 356

Properties of Metal Foils and Foil Laminations (Chart)...Opposite 434
Properties of Flexible Packaging Materials (Chart).....Opposite 414
Properties of Molded and Cast Plastics (Chart).....Opposite 596
Properties of Vegetable Parchments 425
Protecting the Results of Research 115
Protection, Flexible Corrugated for 807
Protection, Trademark and Package 112
Protective Pads and Cushions.... 805
Pulp (for Paperboard Manufacture) 128
Pulp Packages, Molded..... 164

•

Rebuilding Markets for Packaged Goods 43
Regenerated Cellulose Films..... 412
Regulations, Special Federal..... 101
Relating Displays to Other Media 848
Reproducing Designs, Methods of 75
Reproduction, Preparing Art for.. 69
Required and Optional Statements on Labels 307
Research in Paper Production.... 126
Research, Protecting the Results of 115
Research, The Place of..... 30
Resin Adhesives 342
Resinous and Plastic Coatings.... 402
Resinous Coatings, Technical Aspects of 378
Re-use and Decorative Boxes..... 226
Review, Patent 120
Ribbons, Tapes and Ties—Decorative 225
Rigid Sheetings 578
Rinsers, Bottle 642
Roll-leaf Marking and Embossing.. 82
Rotogravure Equipment 686
Rotogravure Printing 78
Rubber Hydrochloride Bags..... 265
Rubber Hydrochloride Film..... 413
Rust Prevention (Machinery)..... 693

•

Sales Spot, Fitting Displays to the 851
Scales and Devices for Check Weighing 639
Screw Type Metal Closures..... 536
Screw Type Plastic Closures..... 539
Sealing and Capping Equipment.. 647
Sealing and Closing of Bags..... 278
Sealing and Filling Bags (Equipment) 671
Sealing and Packing Equipment—Cases 677
Seals, Finishes, Liners for Closures 531
Seals, Tags, Marking Pieces, Labels 300
Secondary Closures 542
Services Section—Buyers' Directory 920
Selecting Package Colors..... 67
Semi-rigid Seamless Vials (Plastic) 588
Set-up Boxes, Pictorial Review of.. 153
Set-up Boxes, Special Types of.... 159
Set-up Box Terms—Glossary..... 150
Set-up Box (Plastic)..... 584
Set-up Paper Covered Boxes..... 149
Sheeting, Printed Transparent.... 415
Shipment of Freight by Air..... 813
Shipping Boxes, Corrugated and Fibre 767
Shipping—New Practices and Conditions 37
Shipping Practices, Standard..... 760
Silk-screen Process 80
Soaking and Washing Machines (Bottle) 642
Soaps—Packaging Materials Forecast 25
Special Federal Regulations..... 101
Specialized Glass Containers..... 528
Specialty Flexible Containers..... 261
Special Types of Set-up Boxes.... 159
Spiral Package (Plastic)..... 587
Spirally-wound Fibre Cans..... 491
Standard Shipping Practices..... 760
Standardization of Glass Containers 522
Standardization, Progress in..... 104
Standards for Color Identity (Chart) .....Opposite 68
Stapling Equipment, Box and Bag 675
State and Federal Regulations, Officials Administering (Chart) .....Opposite 108
Statements on Labels, Required and Optional 307
Steel and Fibre Strapping..... 797
Steel Barrels and Drums..... 771
Steel Drums—Government Restrictions 771
Stitching Machinery (Wire)..... 678
Stock Molds (Plastic)..... 596
Storage Preparation (Machinery).. 694
Store, Display in the..... 869
Strapping, Steel and Fibre..... 797
Strip Coating, Plastic..... 597
Structures for Paper Displays, New 840
Structure of Liners for Closures.. 534
Subject Index, Alphabetical—(Products, etc.) Buyers' Directory 882
Supermarket, Display Practice.... 870
Supplies and Materials Section—Buyers' Directory 885
Syndicated Store, Display Practice 869

•

Tacky-tape Dispensers and Affixers 360
Tags, Marking Pieces, Seals, Labels 300
Tape, Equipment for Applying.... 801
Tape, Pressure-sensitive..... 358
Tapes, Types of Gummed..... 357
Tapes, Ties and Ribbons—Decorative 225
T.A.P.P.I. 127
Technical Aspects of Adhesives.... 332
Technical Aspects of Metal Foils.. 432
Technical Aspects of Resinous Coatings 378
Technicalities of Laminated Structures 435
Temperature Factor (Heat Sealing) 350
Tested Merchandising, Back to.... 47
Testing Asphalts 397
Testing Package Materials and Packages 59
Textile Bags 269
The Glass Package Today..... 516
Thermoplastic Coatings, Applying 404
Thermoplastic Labeling 304
Ties, Ribbons, Tapes—Decorative.. 225
Tight-wrapped Packages 304
Tight-wrapping Equipment 660
Time Factor (Heat Sealing)..... 351
Tin Coated Lead Tubes..... 495
Tinplate (Electrolytic), Future of 483
Tissue Papers, Decorative..... 223
Toiletries—Packaging Materials Forecast 25
Trademark and Package Protection 112
Trademark and Package Trespassing 113
Trade Names, Directory of..... 926
Transparent Bags 263
Transparent Sheeting, Printed.... 415
Trends in Package Design..... 14
Trends to Watch (Plastic)..... 598
Trespassing, Trademark and Package 113
Tube Filling (Collapsible)..... 669
Tubes and Cans, Fibre-bodied.... 489
Tubes, Collapsible Metal..... 494
Tumblers as Packages..... 527
Type in Package Design..... 14
Types of Gummed Tape..... 357

•

Unsatisfied Machinery Needs..... 34
Uses of Asphalts..... 395
U. S. Grade Labeling..... 313

•

Vacuum Sealing 649
Vacuum Type Metal Closures..... 537
Vegetable Parchments 423
Veneered Packages 786
Vials, Semi-rigid Seamless (Plastic) 588
Vinyl Films 413
Vinylidene-Chloride Films 413
Visibility Boxes (Set-up)..... 163
Volume Outage Detectors..... 640

•

Wall and Floor Displays, Lithographed 852
War Changes in Packaging..... 21
War Lessons Which Will Last.... 20
Washing and Soaking Machines.. 642
Waxed and Paraffined Cartons.... 144
Waxed Papers 427
Waxes, Developments in..... 388
Weatherproof Cases, Adhesives for 356
Weighing and Filling Dry Products 635
Weight-sorting Equipment 639
Wet-strength Papers 430
What to Expect from Coatings.... 376
What to Tell Your Adhesive Supplier 355
What to Tell Your Box Supplier.. 165
What's Ahead in Materials (Symposium) 22
Window Displays, Lithographed.. 852
"Window" Packages 420
Wire-stitching Machinery 678
Wood Barrels and Drums..... 783
Wood Boxes 784
Wood Closures 542
Wood Displays and Cabinets..... 859
Wool Products, Labeling of..... 103
Wood Pulp (in the Paperboard Industry) 128
Wrapping Equipment 654



REBUILDING

Trends in package design 14

War lessons which will last 20

What's ahead in materials—a symposium 22

The place of research 30

Unsatisfied machinery needs 34

New shipping practices and conditions 37

Back to competitive markets 39

Rebuilding markets for packaged goods 43

Back to tested merchandising 47

Trends in package design

From the standpoint of appearance, package design received little attention for the past few years because emphasis has been placed on production and structure. However, many producers and designers are of the opinion that competition in the coming era will be greater than ever before—that salesmanship will be needed. What is more logical than to have the package itself play a leading role in selling? Much consideration is being given to the subject. Package appearance is fast staging a comeback. The question is, what kind of a comeback will it have?

A number of leading designers were asked to express themselves on some of the aspects of future design. Naturally, there were differences of opinion among them —and they *all* may be right! Regardless, package users will glean many an idea from these opinions.

Color

Color will be one of the appealing selling factors in postwar packaging, especially bright colors, as a reaction to the somberness of war. People fortunately have never lost their joy in color.—*C. O. Woodbury.*

Regardless of new technologies, color is a natural phenomenon, changeless, and subject to the same old principles. Its manner of use will, or should, depend upon the type of emotional appeal desired for any particular package, as well as upon the type of display desired.—*John Gordon Rideout.*

Color must appeal not only to the sophisticated tastes of the so-called intelligentsia, but to the innate senses of the masses. People with pent-up pocketbooks will spend money as directed by the emotions. Appeal to their emotions through color!—*William O'Neil.*

The use of color in packaging can be broken down to two phases (1) the aesthetic phase which deals strictly with the atmospheric effect desired for purposes of establishing trademark or trade recognition; (2) the technical or practical phase which approaches color from the standpoint of better "lays" of inks, better distribution of ink, and easier printing production—*Robert G. Neubauer.*

Color in packaging moves through cycles even as style does. It is basic to remember that color is important in obtaining package distinction.—*J. Gordon Lippincott.*

One cannot say that this or that color will come to the fore. We have seen time and again a color or a color scheme achieve success by the sheer weight of unorthodox application.—*Josephine von Miklos.*

The chosen colors must not be lost or disadvantageously altered by store lighting. Colors must be chosen that can be faithfully reproduced by television. They must adapt themselves to their setting, and display well. A minimum number of colors should be used on any package, or "family" group.—*Jon Stengren.*

By means of color, a package can be dainty or appear small or large. Color can produce an importance which will separate the product from similar products on the shelf. New methods to combine color with a full view package will be a strong trend.—*Alfons Bach.*

In 1945 the designer must be absolute color autocrat; what he specifies must hit the paper or cardboard in exactly the shade and tone he specifies, and no printer, box maker or intermediary should be given the chance to spoil it. A whole design can be ruined by a so-called "expert" trying to improve the designer's original color scheme. And they'll try every time.—*Everett B. Eckland.*

Ladies don't like loud colors, but ladies' opinions of colors for certain articles are worthless from a sales standpoint. We don't want to make pretty packages, but packages that will sell the product.—*Egmont Arens.*

As to color selection, I always suggest something extremely simple, a reduced color combination which is rather striking and unusual. I personally prefer strong, definite colors. A color harmony like gray and chartreuse can only be used on certain occasions—*Emmy Zweybruck.*

The nature of the product, the market, the season, the eventual point of use in the home, etc., will dictate the color treatment. Certain other factors are more important in choosing color than mere eye appeal. One will be the factor of possible soilage. Handling is another restrictor of color. Any conceivable color can be used effectively for fashion-packaging if taste and discretion are exercised.—*Raymond Loewy.*

Type

Type should be legible and quickly and easily read to catch the eye and understanding of a purchaser walking by a counter or driving past a window—*Mildred C. Lucas.*

Type faces should be selected in accordance with the amount of reading matter to be shown on the package, and it is our opinion that the trend towards its use will be—less of it!—*Tek Osborn.*

Certain type styles have successfully proved themselves in packaging—others to come will be equally good. We have found that a sans-serif or gothic type for the body matter is preferable for reproduction. We invariably use hand lettering for the important message (logotype and name of product) so that by itself it can be instantly identified, thereby becoming a valuable asset in the advertising and promotion of the item.—*Koodin-Lapow.*

Undoubtedly there will be new type faces but they will be along the lines of currently used faces that lend themselves to reproduction. Present packaging laws make it mandatory that all copy on packages be legible. This means that sales copy intended to do a practical sales job must be quickly legible.—*Robert G. Neubauer.*

The trend in type is toward the elimination of irrel-

evant, decorative faces. It is not necessary to go ultra modern to add newness to a package. The use of more middle-tone type faces in minor selling points is desirable.—*Charles Cruze.*

Type will be the speaker's voice. It must speak clearly even when it whispers. It must be legible from a distance or when an overall reduction is made. In many cases a package will be dependent on type for distinctive appearance and display value.—*Jon Stengren.*

Intelligent layout in typography is important. The relationship of space and proportion has a definite psychological effect on sales. Some of the best-looking packages of recent years have involved nothing more than careful rearrangement and proportioning of existing type.—*Raymond Loewy.*

Type is inseparable from layout idea—whether we have new types or not. A bold layout idea can use even an old engraved script and be potent, highgrade "buck-eye"—and a subtle layout idea with the boldest of modern type can be exquisite "high style."—*George Sakier.*

Cleanly styled letters may be individually designed for each problem—designed to bring out the ideas of bulk, beauty, quality, or any characteristic attribute of the product. Type should be used to tell the complete story at a glance.—*Russell H. Bach.*

New trends in use of type, lettering, illustration, etc., can undoubtedly be expected. For example, there may be a swing away from Futura and similar block faces (it certainly is past due!) to more readable, if less modern, types. There will be new trends, but, what of it? Trends have little to do with the efficiency of packaging.—*Frank Condon.*

Copy

In my opinion the face of the package should be applicable to a miniature poster display containing three essential parts. They are: the trademark or trade name, the title of the product, and a subordinate line of copy pertaining to the product's use. Where legislation demands that contents be listed, this should not be permitted to detract from the poster-like quality of the package design.—*Alan Berni.*

There will be new ideas that will come from radio programs and national advertising that will influence packaging copy. I can see a package with no identification except the direction of attention to the free premium it contains, and to the radio program which advertises the product. Perhaps this is the new trend.—*William O'Neil.*

Voluminous copy should be handled in separate literature. When it is necessary for directions to appear on a package, the treatment should be simple. Description should not be too glowing in character, but mere statement of fact. Recipes are an asset on a package—provided they do not conflict with good design.—*Tek Osborn.*

Copy on the package must have a definite informative and selling function. We try not to use informative copy as part of the basic design but to position it where it can be clearly and quickly read.—*Koodin-Lapow.*

Copy should be governed by the thought that the package is an advertisement for the product it contains. Copy should be changed with the seasons when product uses vary with the season.—*Charles Cruze.*

Copy should be of few words. It should ring out the

1—*In this new family are sixty products, each division having its own color combination with harmony between all. The entire line is united by a basic trademark. Designs by Koodin-Lapow.*





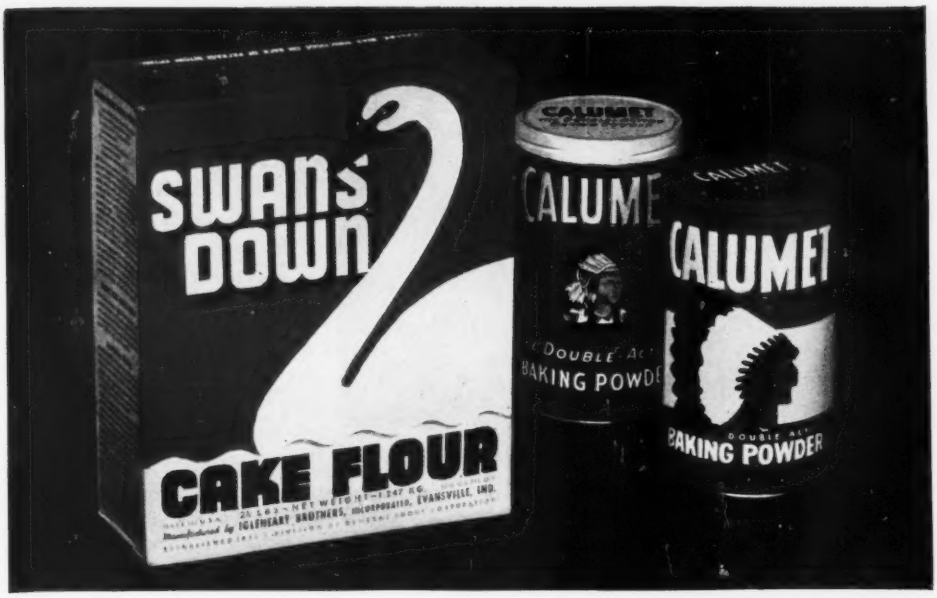
2

2—*Unusual products have especial need for informative packaging. These packages present three points considered vital by the designer: (1) trademark or trade name; (2) descriptive name of product; (3) use of product. Color is employed to accent them. Designs by Alan Berni.*

3—*"Packaging submits the character of a product . . . Dignity and simplicity and the highest level of art work are required." Particularly are these principles applicable in the field of gift packaging, where it is very easy to overdecorate. Designs by Emmy Zweybruck.*

3





4

4—Quick identity marks and recognition value of design or pattern, in the philosophy of this designer, take precedence over exact color matching, though intelligent application of color is important. Designs by Jim Nash.



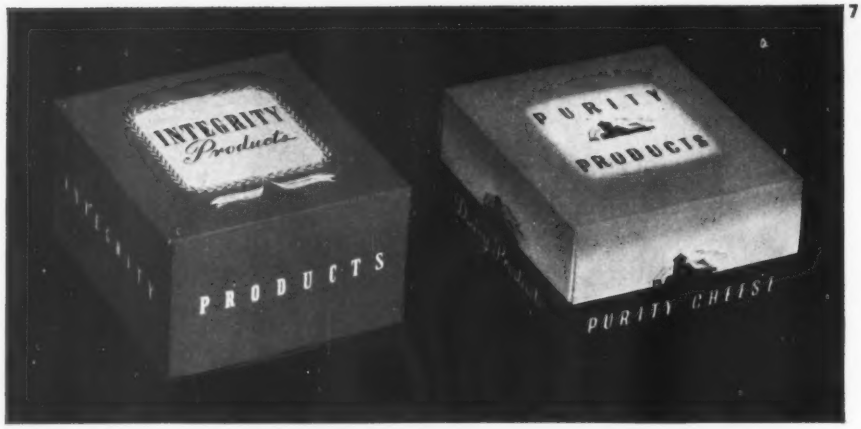
5—This package neatly solves a design problem: devising a basic structure to contain various combinations of different articles such as electrical items. Transparent window reduces need of copy. Design by Russell H. Bach.



6

6—This package applies two principles which a good designer may never forget: (1) the nature of the design must fit the nature of the product; (2) a design must meet the requirements of the merchandising outlets through which it goes to the consumer. Design by Frank Condon.

XUM



7

7—Color and design may be used to create impressions or to produce atmosphere. One of these two hypothetical packages is designed to develop full confidence in the integrity of the product; the other arouses a desire for cleanliness and for purity. Designs by Robt. G. Neubauer.

old language, and ring in the new.—*Everett B. Eckland.*

Far too many packages lack the one-two-three clarity in copy and design—first the name of the product, then a short, clear explanation of what it is for or what it will do, then what copy is necessary.—*C. O. Woodbury.*

Copy will be restricted to bare essentials and used as a type decoration or color pattern.—*Jon Stengren.*

We are definitely recommending one display face, using the back of the package for recipes and other appropriate applications. I think women are studying packages, and are depending on them.—*Jim Nash.*

Illustration

In many cases design can be made of illustration. New methods of printing, new inks, new materials, will determine the economic advisability of one type of illustration as against another. The type of market, which means type of taste, will always be a prime consideration.—*Josephine von Miklos.*

Illustrations should be simple to give color prominence. Detailed pictorial scenes tend to distract the eye and mind, and to confuse the issue. Purchasers remember simple, pleasing packages that do not require too much mental stress for immediate identification or memory. —*Mildred C. Lucas.*

The product must be the governing factor in the type of art work to be used on a package. Photography rings the bell on an inanimate product, yet fruitcake that must definitely sell on "taste" is best portrayed through an appetizing pictorial.—*Alan Berni.*

I hope illustrations, especially color photographs, will not play a more important role than pure design. The domineering application of a naturalistic illustration is necessarily opposed to any three dimensional conception of a package.—*Herbert Bayer.*

We would not say that illustrations are by any means more important than pure design. Color photography is most effective, if the product lends itself to this medium. Black-and-white illustration, however, can be made very forceful and direct, and it is considerably cheaper to reproduce than color.—*Tek Osborn.*

From the point of sales display, illustrations will stimulate greater interest than will pure design. On packages, fine drawing will be superior to color photography and black-and-white photography because of its greater simplicity and punch.—*J. Gordon Lippincott.*

Good packaging should be the symbol of an idea. The simpler the design, the stronger the results. Pure design will always have a higher artistic value than other treatments, but a combination of lettering and outstanding photography is likely to be very successful, because photography is easily understood by large masses of people.—*Emmy Zweybruck.*

The public will always enjoy pictures, yet I'm hoping for a growing understanding of symbolisms such as those now appearing in some of our more advanced designing. The use of symbolism permits a greater play of the designer's imagination and lends to his work the attractiveness of the unusual.—*C. O. Woodbury.*

Illustrations in color photography will be increasingly used. They bring out a richness not always detected in the product itself.—*Russell H. Bach.*

Frankly, I have been disappointed with photography as a means to portray foods. At present I am using paintings—working closely with the engravers to get the best results. Although I have seen some very fine reproductions made by photography, I believe I will get the results I want better by using paintings, and will get them at no extra cost.—*Jim Nash.*

Features to be emphasized

Features to be emphasized on the package depend entirely on the product, its relation to competition, its acceptance in the field, method of distribution, the kind and weight of the advertising behind it, and many other considerations. Correctly analyze the job to be done, then you know what to feature.—*John Gordon Rideout.*

Unless the package is based on a cautious survey of what is required by the distributor and the retailer, as well as the ultimate buyer, it is not likely to do the full job. There might be good reason for emphasizing the brand name on one line of packages and equally good reason for subordinating it on others.—*Frank Condon.*

Next to color, the most important feature to be

emphasized is the product name. If the product is of a new brand, the manufacturer's identity should be established in an accessible spot.—*Mildred C. Lucas.*

I am a strong believer in brand identification. This can be accomplished by a trademark, trade figure, or the popular brand name. I use illustrations where they are necessary, but avoid them if possible to simplify production problems.—*Jim Nash.*

I feel that there still has not been enough emphasis on one function which packaging should perform—that of identification. Like a book jacket, the package should be suggestive of content, arousing interest before the story is read. People identify a product by its packaging. Easy identification promotes repeat sales, through memory. Symbols and shapes, brief text, legible type, and new uses of attractive material will all help to accomplish this. —*Ladislav Sutnar.*

There will be a trend toward identifying products by initials, instead of by long names; trademarks will take on a simplicity to be understood in the broad markets of the world.—*William O'Neil.*

Influences on design trends

Store arrangement from the purely physical aspect points to the pleasing color and prominence of the name of the product. Designers should at all times recognize that the buying public is in a hurry, mostly feminine, and fairly young.—*Mildred C. Lucas.*

Above all, the designer must remember to be an average individual with average tastes, never creating a package above or below the normal acceptance of the ordinary consumer.—*Alan Berni.*

The main factors influencing trends in package design are sales displays and consumer buying habits. Both these features throw emphasis on the memory value and display angles of design.—*J. Gordon Lippincott.*

The use of windows and the extensive use of glass containers will give illustration stiff competition. The housewife is accustomed to examining the contents of a container before she buys. She won't be easily convinced that a completely covered article, represented by a fancy picture, is better than an article she can actually see. —*Russell H. Bach.*

A great deal of interest and emphasis will be given to re-usable container packaging. This type of semi-premium development might influence the packaging trend toward an entirely different direction.—*Alan Berni.*

Open displays are influencing store arrangements. They contribute to the convenience of the "pick it up and buy" habit of the consumer.—*Charles Cruze.*

Other aspects

We have always followed the premise that package design is the control of appearance so as to project the product's identity and character quickly and pleasantly, plus the invention and engineering of utility and protection.—*Koodin-Lapow.*

The public is not going to like new products and new packages merely because they are new. Slam-bang art, overnight lettering, copy-cat modernistic touches may well be the kiss of death.—*Everett B. Eckland.*

The primary consideration in packaging design is to convey the quality of freshness—new, attractive, desirable merchandise.—*George Sakier.*

In the future design of packaging, I hope to see a closer coordination between a product's advertising and the designing of its container. When the package "idea" is carried out in the advertising campaign it can double the value of both the good package and the successful campaign.—*Ladislav Sutnar.*

I believe that there will be a swing away from all those characteristics of packaging which associated themselves with the war, and that the various technologies released for peaceful industry will introduce new values and functions in packages.—*John E. Alcott.*

I believe that good package design in such fields as foods, drugs and cosmetics will greatly affect the public taste in the selection of furniture, fabrics and accessories —in fact everything for the household and office. Perhaps packaging can be one of the greatest influences for good—or bad—that exists.—*Robert Gruen.*

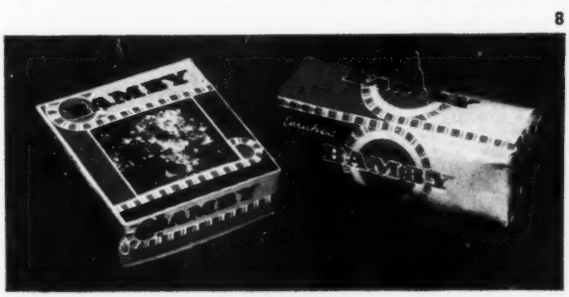
Political and economic conditions, the maintenance of the present high wage scales after the war, the advent of the super-market—all these influences clearly point out the new direction of merchandising and packaging for almost every industry. Substitution of package for clerk may sound far fetched, but is it?—*Norbert Jay.*

It isn't what people *think* about a package that counts, it is what they actually *do* when buying.—*Egmont Arens.*

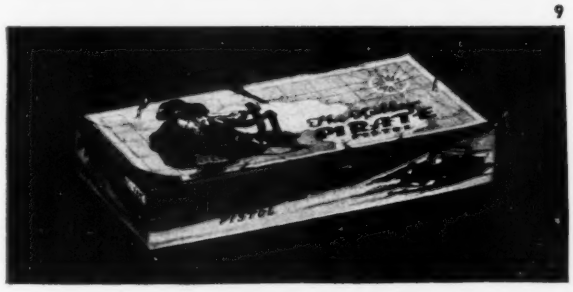
It is possible that postwar design and color will not be pleasing to everyone. There were those who decried every change that was ever made. And they will be with us again.—*Donald Best.*

8—These new bakery packages are strong in simplicity of design and clever use of contrasting colors. Designs by Mildred C. Lucas. 9—This bold pirate depicted on a package makes youngsters' eyes gleam. Design by Donald Best.

8



9



War lessons which will last

by C. O. Kendall

The war's lasting lessons for packaging lie in fundamentals—simple fundamentals which had to be relearned the hard way. It is to be hoped they will have been well learned and will be applied during the first confusing months of peace.

The certainty of hindsight tells us it should not have been necessary for a Phil Kennedy to spend time in the South Pacific photographing mountains of unsatisfactorily packaged material to convince us that metal will corrode; that moisture deteriorates paper and will loosen labels applied with water soluble adhesives; that material traveling fifteen thousand miles will receive rough handling, etc. We knew these things. But our production program was very much hurried.

In the development of physical package specifications during the coming period we will face new markets, new products, new materials and new equipment—conditions not greatly unlike those prevailing during the first chaotic months of war. We will also hurry to produce.

Sound package development in anticipation of this period will find firm ground in certain basic precepts which are broadly applicable to the package requirements of any industry:

1. The time required to plan a new package properly is never lost time and is relatively less expensive, hour for hour, than time in any subsequent stage of actual production
2. The package is seldom an end in itself. Its success is most directly measurable in association with the product for which it was conceived and its development should never proceed apart from the product which it is to contain
3. The primary function of the package is a three-fold utility:
   a) As a receptacle—a unit formed to efficiently receive a product and permit it to be conveniently dispensed
   b) As a container—a unit which having received a product, must properly contain that product under all anticipated conditions of handling and storage during both distribution and use
   c) As a package—a unit which serves to conveniently transfer a product through chosen channels of distribution to the consumer

It will take many years for packaging to sift and assimilate the specific war contribution of hundreds of industries and individuals to its sum total of knowledge but it can immediately benefit by increased attention to relatively simple and basic fundamentals.

In our company, we are naturally endeavoring to utilize war lessons in our routine operations. It has always been our practice to start packaging with the requirements for product stability and protection, then proceed to sales for utility and distributing considerations, thence to production and purchasing. The responsibility for arriving at any necessary compromise falls inevitably on production and purchasing.

The "perfect package"

There is of course no perfect package—unless you exclude your competitor's package for a product which outsells yours 3 to 1. Nevertheless there are many good examples of intelligent package planning. Such plans begin with the conception of the dream package which is usually considered to have:

Perfect sales appeal, display value and utility
Perfect product protection
Ideal production simplicity
The lowest possible cost

In the development from this point forward, that is, the development of a plan, compromise is almost unavoidable. It is usually arrived at with the following conflicting viewpoints as factors—slightly caricatured:

To the sales department, the perfect package is one which will outsell all competition. It is usually the most expensive of the alternate ideas proposed but this cost factor should miraculously not be reflected in the selling price of the product. It carries a design which will be constantly fresh and in step with the changing trend of the years but this is to be accomplished without changing the original package appearance, for some people will like the old design. (Perhaps radar is the answer to that one.)

To the department responsible solely for the product (in the drug industry, we call that the control laboratory) the ideal package is one which is sterile upon receipt; chemically inert; hermetically sealed; with unbelievable strength features; zero moisture-vapor transmission values and all qualities which make it impervious to extreme icebox or oven conditions.

To the production department, perfect specifications are those which define an item immediately obtainable from the perfect source of supply—a source which they have predetermined.

The legal department usually has requirements which would only be met by a container which would collapse to minute size when viewed from the standpoint of outage and expand to billboard proportions when inspected for type size and amount of copy carried.

With these as factors, the final package plan becomes a compromise; a compromise which is successful to the degree that the solid fact behind its conception and development convinces each conflicting viewpoint of the rightness of compromise. The planner's job is one of realistic conception and of development through modifying coordination.

From the standpoint of production and purchasing, the

"white hope" of the future lies in simplification and standardization. The problem is one of a vast number of products—we have some 1400—packaged for sound utility reasons in everything from capillary tubes to 55-gallon drums. Both product and package are subject to continuous change resulting from research and progressive development. Requirements such as these can only be met when packages and packaging lines are designed for flexibility. Flexibility with maximum efficiency is only another way of stating the process of standardization.

Currently, as an example of standardization, we plan a line of special mold bottles ranging from 5 cc. to 32 oz. in capacity and graded in capacity increments of 15 per cent. This standardized bottle line will reduce by 35 per cent the number of bottle items required for our products and accomplish a comparable reduction in number of label sizes, items for interior packing such as partitions, liners, mats, and in corrugated shippers. The favorable effect of this planned package simplification upon production is, I believe, obvious.

War changes

Prior to the war, something over 70 per cent of our products were packaged in glass, that is, in bottles, vials or ampuls, with the remainder in tins, aluminum canisters, collapsible tubes, plastic vials, unit wraps in transparent sheeting and folding and set-up boxes.

Basic package changes by reason of war controls have been effected on relatively few of our products—mainly those not classifiable as essential drugs. By saying that, I would not pretend for a moment that I would be in a position to interpret the War Production Board's definition of what was essential.

Tooth powder was changed from metal to a paper canister with molded plastic dispenser top.

Epsom salt, soda bicarbonate and the balance of a line of home-necessity dry powders, went from metal tins to a bag and folding box package.

Aspirin changed from the familiar tin of 12 tablets to a folding box.

Sulfa tablets for export were shifted from extruded aluminum canisters to paper tubes with scrap metal ends. These, incidentally, are now back in aluminum canisters.

Minor changes in material and physical specifications have effected every product in one or more ways:

The tin content of collapsible tubes has been progressively reduced.

Single shell blackplate caps have replaced the double shell tinplate variety.

Except when necessary for product stability, overwraps of transparent sheeting and viscous band overclosures have been eliminated.

Manila back folding boxboards have been replaced by the newsback grades and all calipers reduced to the minimum. Individual cartons have been virtually eliminated for all bottled products.

Non-test liners are used on all interior packaging and lowered test liners on all shippers for the distribution of civilian stock.

Shipping units have been substantially increased and re-used boxes employed wherever original distribution is to controlled points.

Rubber formulas have been successfully revised for dropper bulbs and for serum bottle stoppers.

As we see it now, very few of these wartime changes will be retained when we are again in position to secure material presently restricted.

Looking to the future, glass will undoubtedly remain our major packaging medium. This follows from the fact that we package primarily for product stability and nothing yet equals glass in this field. We will want improved bottle closures designed specifically for drugs and the help of the glass and closure people in the development of fewer finish sizes and closure liners with more universal application for our products. Our present requirements of nineteen closure sizes and 15 liner materials, geometrically add up to a production headache.

Our export managers pray for an improved closure to meet the handling, temperature and humidity conditions in their markets. Such, we believe, will be developed although to date we have seen no fully satisfactory answer.

The export field generally will be large and invites the development of new packages with greater product protection and lighter weight. As primary packages, the newer materials in unit wrapped form, appear to answer this need. The plywood-plastic-fibreboard laminates promise a means of applying war earned experiences in packing for off-shore shipment to peacetime export needs.

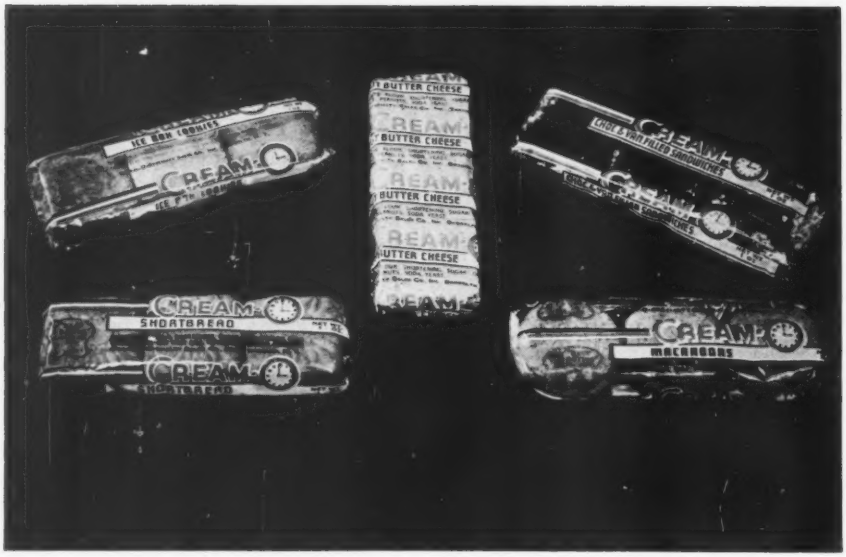
We need a better way to keep bottle labels dust- and smudge-free on the dealers' shelves and in the users' possession. Hiring representatives to wipe them off periodically is an alternative to our prewar practice of manually wrapping each bottle in transparent sheeting but would not very greatly reduce our costs.

We look for many new developments in plastics but will proceed cautiously because of product stability. Our need here is for samples for testing and more and more technical information on which to base these anticipated developments.

The folding and set-up box industries will soon be in position to offer new qualities of board strength, appearance and printing surface, to reinspire the interest of the designer who has fought a losing battle with quality these past few years.

In summary, then, we look upon package planning as a process of compromise with basically conflicting viewpoints, all of which must be considered. We feel there will be many improvements, many changes, and that practically no package that we have now on the market will remain unchanged. We feel that the cooperation between the supplier and the user, the development man, the purchasing man, the production man, is of first importance.

In closing, wartime developments in materials and technique offer packaging many new tools for progress. The war, however, didn't create this progress. Rather, it came because a condition existed in which the buyer was willing to foot the bill for the newest and the best. This is one wartime circumstance which should be made to continue, a joint interest of buyer and seller in the cost of developments looking toward improved products.



1—Cellophane foil, which permits visual packaging, will be an important postwar material of many uses. Here printed cellophane is employed to wrap novelty packages sold through vending machines by Cream-O-Specialty Sales Co., pioneers in this type of merchandising of bakery products.

What's ahead in materials—a symposium

Through circumstances thrust upon it, the packaging field has broadened its conception of materials. Many of the developments and achievements, which have sprung from war exigencies, appear to be almost in the nature of miracles. Reflection will show, of course, that this is far from the case—instead, research, science and extreme effort have produced these astounding changes in materials and in their applications. But will these changes meet civilian and peacetime requirements? What materials—formerly scarce—will return? What new materials will remain?

The forecast of materials is something like the forecast of weather—nobody knows until it happens. But, if conditions are thoroughly studied and intelligent and scientific consideration applied, a pretty accurate "antecedent calculation" may be made.

Who is equipped to make this prediction? Logically, the *users of packaging materials*. Leading manufacturers of packaged goods were asked for their materials forecast. They have been asked specifically to indicate the prognosis for: paper and paperboard products; laminations and combinations of paper and other flexible films; glass containers; closure materials—cork, rubber, wood, paper, metal, plastic; metal foils; metal containers; new substitute coatings and lining materials for metal containers; collapsible tubes and the various substitutes for them.

The four articles which follow have been selected as representative of viewpoints embracing the entire packaging field. In order, they will embody manufacturers' predictions from the following aspects:

1. Food products
2. Drugs and pharmaceuticals
3. Toiletries, soaps and cosmetics
4. Photographic supplies

These experts agree that an accurate forecast of materials is impossible, but the sound and logical opinions expressed should give the reader a basis for making his own calculations.

Food products

by T. R. Baxter

With all that has been published on the subject of paper and paperboard products of late, it is unlikely that much can be added. At the expense of some repetition, it is well to review the following for a better understanding of the causes and effects that will either eliminate old types or induce the use of new ones.

In the consumption of paper products, whether made in sheets or board for folding boxes, solid fibre for shipping containers, fibre drums, and the like, there has been a steady increase in the tonnage employed for various packaging purposes from 1940 to date. The most noticeable increase is in the consumption of paper used in the manufacture of fibre drums. Most of this is due to the large use of these materials for the packaging of products for shipment overseas.

For the duration of the war, the consumption of raw materials out of which these paper stocks are made will remain close to these levels. It will be some time after hostilities before this kind of raw material will be converted entirely for home consumption. Also, it is not expected that the Scandinavian pulp producing countries will soon be shipping to the United States in prewar volume. The first available supplies will go to England

and other nearby countries that have suffered for the want of paper making materials.

Some time will also elapse before civilian industry will be able to take advantage of some of the newer types of chemically treated paper products which will have the characteristics we want in packaging. It is not the writer's opinion that there will be a sudden release of these things. They will come gradually at first and gather momentum as rehabilitation takes place in Europe, and as these new things find their place in this country.

Bear in mind, on account of restrictions, many of these new and better paper products have not been available to civilian industry and they will have to be evaluated and their potentialities discovered or determined before they find their places. This change might be slow by reason of the fact that there are but few places in civilian industry where package specifications of the kind employed on products for overseas shipments will be required. Consequently, specifications as laid down by the WPB will not necessarily be adopted as such in our postwar packaging, and, as stated before, the change will probably be a gradual one.

We can look forward to new chemically treated papers that will have better functional qualities than those available before the war. These papers will be made to fit specific needs. Types are being made at present with superior wet strength, others that shed free water, and have surprising resistance to prolonged immersion. Use will certainly be made of products of this character in the frozen food industry; and where dry and hygroscopic products are concerned, papers with extremely low MVT rates will be used. Where the last mentioned function is concerned, laminated combinations of paper and synthetic film will come into play.

Some people seem to feel that there will be many new materials having new and different physical appearance. Opinions regarding the details and extent of these changes vary greatly. There is no reason to suppose that postwar packaging is going to be revolutionized as far as appearance is concerned.

The progress demanded by the services, has, it is true, accelerated all research and development programs. War services have been demanding the utmost of raw materials, and have used these materials up to and beyond their capacity. This tendency has helped to establish their virtues as well as to disclose some of their weaknesses. Specifications of the armed forces, for instance, have been revised continuously, so as to reach higher performance levels as new materials appear. This has been practiced to the extent that some standard and normal commercial materials have been rejected. Through this period of accelerated development and production, then, performance requirements have been more rigorous than experienced in peacetime. We should realize, therefore, that many materials used by the armed forces do not directly apply to our peacetime packaging. They may demand waterproofness to the point where the container must withstand immersion, or extremely long storage under severe conditions, also great physical durability. There will be no commercial requirement equivalent to storage under the palms of Tarawa, or on the beaches of Attu. We can be sure, therefore, no company will take over Army specifications extensively, but they will use the materials and the experience to a limited degree. For example, the material and technique used to make a component of the K ration may be employed for the commercial production of a similar product, but actually as a less durable and less protective package.

Postwar we can expect all of the old packaging materials and package forms to be back on duty. Cellophane will still be a most popular transparent film. Glass and tin will be used for processed foods and vacuum packages. Various papers will look the same and will be doing the same kind of job. There will be new materials and new combinations of them, but they will not be as apparent as many think. Some of the old laminated structures will be improved by new plastic laminants, having greater durability, better moisture protection, etc., although they will appear and look the same as before. Time will pass before any one of these will do some specialized job and find its place in the packaging field. In other words, many postwar packaging changes will occur that will affect the functions of the materials employed, and which will not be visual or obvious, except in performance and service.

War pressure "to produce" has developed a momentum, which should carry on over an appreciable period. Industrial laboratories take new developments from the test tube through the pilot plant stages more rapidly. For a considerable period, then, we can expect new materials to be offered frequently; at least, until research activity subsides to a more normal level. Government packaging specifications have been very effective in improving quality and uniformity, by the control exercised over materials during war production. These specifications will be a very healthy thing to carry over to our peacetime packaging activity, because they will operate to improve the uniformity and quality of all items. In general, they will be reflected in the quality and performance of packaging materials modified to cover peacetime activity.

Every change in the formulation of a product to be packaged, or the introduction of a new packaging material, necessitates some sort of a re-evaluation of the ability of the package to arrive in the consumers' hands in usable condition.

The question may well be asked as to why it is necessary to re-evaluate these materials critically after such changes, when it has not always been so important to do so in the past. This is because the trend in packaged products is to more complex and pre-treated forms, while many years ago a high percentage of packaged goods were commodities such as sugar, flour, salt, etc. As products become more complex and more sensitive, it becomes necessary to check each change of ingredient or material to see whether or not stability has been affected.

The trend toward small unit packages before the war will be emphasized in the postwar period. This will make it necessary to use more protective materials and to form the package more precisely to ensure preservation of the contents.

On the subject of glass containers, to all external ap-



2

2—Various laminates, including plywood, will serve for packaging. Here plywood tubing is suggested for re-use cosmetics containers.

pearances this material will be the same as it was before the war.

There will be improvement in the design and form of glass containers. Progress has been made in the technique of molding lightweight glassware. The industry has learned how to distribute the material throughout the walls of the package more uniformly, and also more about the heat treatment of glass, both of which contribute to a stronger package.

Improvement also has been made in handling and conveying equipment, so that higher packing speeds can be maintained with less breakage.

Glass is a plastic material; and the container is made, or fabricated, if you will, in a mold. For most part, molded products cannot be made with great precision, because of the tendency of the product to expand or contract after leaving the mold, and because of certain dimensional changes that take place by reason of the subsequent treatment.

Until recently, it has been difficult to achieve an efficient seal on glass equipped with threaded finishes, due to the unevenness of the surfaces against which the seal is made. Improvements have been made in the closures themselves and in the finish on glassware that will enable the packer to obtain a seal at high speed that for all practical purposes will be just about perfect.

The accomplishment of an efficient seal on glassware is due to the combined efforts of both glass and closure manufacturers. As far as closures are concerned, wood and paper were substitutes, more or less "war babies." The effective materials of which we can expect them to be made in the future are metal, plastic and cork; with rubber, synthetics, paper and foil, and various combinations of them as liners.

Considering, then, that glass as a material will stand higher initial vacuum, and also higher pressures than most materials, it is reasonable to expect that glass will find many new places in the packaging field, and also because lightweight ware will be less costly.

Glass, because of its transparency, embellishes many products, and it invites visual inspection, which is a matter of great importance to the consumer, and will account for continued and larger use postwar.

Drugs and pharmaceuticals

by H. E. Nack

As the zero hour approaches, we must decide just what packaging materials, old and new, will be selected for postwar use. The pharmaceutical and biological manufacturers, marketing a line of several thousand items are facing a task requiring careful study, good judgment and possibly a little guess work.

Packages adopted of necessity, as temporary expedients, have been "on trial" now for two years or more and have attempted to do their duty. But on the whole they have served only as substitutes. Although we are grateful for their success in keeping our products on the market, nevertheless, the time has arrived when we should evaluate our conversions on sound package engineering.

Many of our substitute wartime packages have been and are even more costly to fill because they require special equipment. The yardstick used in such an industry as ours differs from that used in a specialty house which merchandises a few large selling products. We must package many items on standard equipment and cannot retain after the war a substitute requiring special equipment, even if the substitute has been doing a good job.

Super packages—plastic and what-not—are romantic. But first consideration must be given to tested materials, while our dream packages are cautiously appraised. When the war is over, many materials which have been scarce during war years will return and some of the improvised and new materials will have earned for themselves a definite place in packaging.

Paperboard products—Folding cartons which have been eliminated in the interest of conservation, not only will return, but many products which were cellophane or glassine wrapped will be cartoned in order that they may be packaged on high-speed production lines.

Set-up boxes are still indispensable, and many biological and pharmaceutical products will be continued in this type package.

Paperboard canisters—It must not be supposed that because of the trend away from paperboard canisters, with or without metal ends, they are destined to be eliminated. Lightweight, moistureproof canisters fabricated from paperboard, laminated with the new protective coatings, can easily find a place in the drug industry if protection and cost factors are comparable to metal.

Laminations and combinations of paper and other flexible films—Unit packages, widely used in the drug industry for tablets, pills, capsules and powders, will find expanding uses because of the availability of improved flexible material with high MVT ratings.

Cellophane and other flexible films will enjoy greatly increased usage, and the newly developed war films will give us a wide range for selection. Their use as overwraps to give our packages extended shelf life and sales appeal is a foregone conclusion.

Glass containers—Glass still remains the most popular medium for the drug industry. Its value has been increased by the use of lightweight and standardized models. Private molds will be insisted upon for specialty products. In general, we may expect to see products now packaged in substitutes return to glass. Products now in glass will continue to be packaged in glass.

Collapsible tubes and substitutes therefor—High grade pharmaceutical products will unquestionably be converted to pure tin tubes when such tubes are available.

Lead, aluminum, magnesium and plastic tubes must be considered as future possibilities. It may be advisable, however, to await developments, which may take several years, toward protection of the container and its products by the use of wax and synthetic coatings. Moreover, the plastic tube has weaknesses which may be ironed out.

Closure materials, cork, rubber, wood, paper, metal and plastics—Cork, rubber, metal and plastic closures will still continue to be indispensable. Wood and paper closures are economically contra-indicated.

Metal foils—The protective properties, developed in the last few years by the use of plastic laminates, vinyl resin coatings, etc. and the anticipation of new high speed equipment will undoubtedly make foils among the outstanding packaging materials of the postwar era.

Metal foils will find increased use as individual wraps and as overwraps for small packages which require long shelf life.

Metal containers—Tin or black plate cans in the larger sizes for bulk items are scheduled for quick return. Product protection and cost make conversion mandatory.

Merchandise or over-the-counter items will be at least temporarily restored to tin, pending a careful study of improved paperboard containers.

Aluminum containers will find an important place in postwar packaging because of their light weight, provided they are available with interior fractureproof linings to ensure the stability of the product.

Plastic containers—These are destined to appear gradually on favorite products that justify "de luxe" treatment, when samples and technical data are available for study.

We should like to look forward to stepping forth into new realms of packaging when the war is over. But before we can enter on such a venture there must be months of stability tests, cost comparisons, studies of production problems and sales evaluation to determine the practicability of our dream packages. During those months we shall be only too glad to stand again on firm ground, returning to our old safe and reliable containers.

Toiletries, soaps and cosmetics

by E. H. Balkema

Packaging is one of the most interesting of subjects about which there has been much written. There is, however, not too much specific information available. Therefore, a detailed study of each product, coupled with extensive tests, is the only practical method of determining the package to be used.

During the war period we have been required to improvise and use materials which would have been given little consideration in the prewar period. Formerly, tests would be conducted for a year or more before approving a new package and then only for limited distribution. This practice is not applicable to the present time, for today we now frequently conceive an idea and are required to have it in production on a nation-wide scale within a period of thirty days. Very few of the more complicated packaging problems now permit more than ninety days for their solution. In this work we are guided by newly developed break-down tests, some of which give us results in ten days which formerly required six months.

Packaging is a progressive science, based upon an accurate knowledge of the individual product and the materials available to house it properly permitting delivery of the product to the consumer in usable condition. Experience indicates that after a package has been developed, time reports from the field, customer's reactions and our ever changing ideas of what constitutes a proper package will indicate the desired changes and also various improvements.

With the above test experience as a background and our ever changing ideas on the use of packaging materials, it is most difficult to look to the future and accurately forecast what materials, which are now scarce, will return. Equally difficult to forecast, is what new materials or new uses of old materials developed during the war period, will remain.

Paper and paperboard products—Due to various limitation orders placed on the paper mills and their inability to secure the desired pulps, there has been a drastic cut in the quality of paper and paperboard. To illustrate, one manufacturer refers to the stock now being used by him for corrugated containers as "Bogus-Bogus." Similar reductions in quality due to the extensive use of waste, now have been put into effect for most products produced by the paper mills.

A return to known standards of quality which will permit us to forecast results will be welcome and will relieve the packaging industry of the severe hardship now imposed upon it, due to these substandard materials.

Laminations and flexible films—Great strides have been made in applying laminated stocks and flexible films in packaging, especially for the protection of equipment and food for our armed forces. This progress has been accomplished despite the fact that very few new materials have been developed during the war period. Most of the improvements that were made were the result of changed thinking and the combination of known materials by means of present or new laminating agents or coatings.

Flexible films are outstanding in their use not only because of the protection they offer the product, but also because they give it an appearance of quality. When printed on the reverse side some exceptional results can be obtained.

Any quality of printing or degree of moisture-vapor or flavor protection can be obtained by means of flexible films or laminations of films, paper and metallic foils.

This revised method of thinking and the new knowledge gained as to the application of existing materials will

XUM

have a definite application in the postwar period. Look for its extended use.

Glass containers—Great appreciation is due the glass industry in its effort to produce the great tonnage of glass containers necessary to fill the gaps made by the loss of metal containers for civilian use. During this emergency, the consumer has accepted glass in place of metal and there will be more demand for glass in the postwar period, due to eye appeal.

The glass industry has been making extensive laboratory tests on better containers. The biggest trend in these developments is toward lighter weight glass containers accomplished by designs which permit a uniform control of thickness of glass, thus obtaining a container as strong as the old heavy weight glass. A great savings in weight will be obtained as there will be a reduction in weight, on some containers, of as much as 33⅓ per cent. Glass containers must be well designed not only from appearance viewpoint but from the consumer viewpoint.

Plastic containers have been considered to take the place of glass but due to cost and also moisture, flavor and odor protection, there is a good deal of improvement yet to be made.

Closure materials: cork, rubber, wood, paper, metal, plastic—The war has given the packaging industry a wonderful opportunity for being "in the know" on the various closures used.

Closures must be considered by the following standards:

1. Protection of product
2. Sales appeal
3. Convenience of consumer use
4. Durability
5. Economy

Metal closures with the proper liners and lacquers are generally accepted as the number one protection of the product whether it be a standard type thread finish, a lug finish, crown finish, or whether it be some special "tailor-made" finish. Cork or rubber closures should only be used when products demand it. Plastic closures may be used for the appearance or beauty of the package, but should only be used in the small millimeter bracket. Paper caps have been useful substitutes but the caps are practical only on packages containing products such as milk where there is daily consumption and large reserve of liquid available for evaporation loss. Wood caps have been a poor substitute, due to warpage, cost and inability to obtain standard raw material. Liners are most important in the protection of the product. The manufacturer's laboratory has a big part to play in adapting the proper liner to the product.

The closure as an important part of the package must have an eye appeal, whether the product be food, shoe polish, or cosmetics. Plastics have an important part to play in eye appeal. Postwar plastics will come in large variety from which the proper quality and color may be selected. Metal caps can be dressed up by printing and color so as to be accepted on any package.

Closures should be easy to open—one that sticks may cause the loss of a customer. Some closures may require a removing device, such as a bottle opener, therefore, the cap must be removable by a recognized device. Closures must be designed so that they can be opened even with a slippery hand. In the drug line, many closures incorporate applicators for consumer convenience.

Closures must be protected by a finish or constructed from materials which are resistant to rust, corrosion and to warpage.

Most closures are economical but the manufacturer must consider the cost of the closure for his particular product. It is profitable to obtain an outstanding closure if the product warrants it.

Metal foils—Metal foils have played a most important part in the wartime packaging and the results obtained in shipments to all parts of the world are outstanding. In this field of packaging materials, it is not new materials but new or extended use that is important.

There are many uses for metal foil which have not been fully developed to date. Outstanding in its characteristics are moisture and flavor protection. These particular characteristics are not frequently found in any one packaging medium, generally requiring two or more materials.

Metal foils not only fill a necessary place in protective packaging but they also permit high quality printing to be used for decorative purposes. The present trend in design is to use the natural color of the foil for highlights or emphasis in the art work rather than the general past practice of using the foil as the background of the package. We can expect an expanded use of foils in the postwar period for inner packings, outside wrappings or laminations.

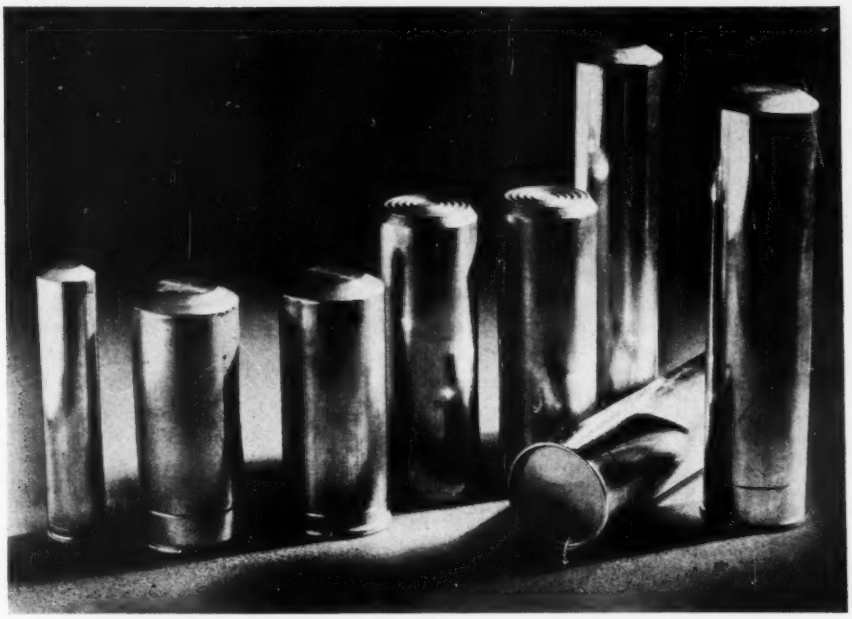
Metal containers—The metal container industry has done an excellent job in our wartime packaging. Metal is required by a great many products, especially foods, and stands up well when roughly handled, as in shipping.

The use of metal containers for certain civilian uses has been severely curtailed by the Government. In order to keep many products on the market, there has been a mad scramble among packaging men to find substitutes ranging all the way from molded pulp fibres to plastics. In some cases excellent results have been accomplished and many of these packages will live even when the free use of metal returns. However, in most cases metal is still preferred when one is confronted with problems such as moisture-vapor retention, flavor retention, maintenance of size, warping and many others.

With the increased availability of certain metals, alloys and coatings not formerly used extensively in the manufacture of metal containers, we can expect their application in this packaging field. For example, aluminum was not used extensively in the past for this purpose, despite its many desirable characteristics including lightness. Also, it is possible to extrude the smaller containers rather than manufacture them in the usual manner.

Collapsible tubes—No single item of packaging has experienced as many changes as collapsible tubes and still maintained essentially the same outward appearance and use characteristics. Many products, before the war, were placed in collapsible tubes made of tin and decorated with base coats, inks and lacquer. These tubes could

3



3—Rigid aluminum containers, feather light and virtually unbreakable, will be available for packaging civilian foods, drugs and similar products postwar. They may be hermetically sealed. Photo, Aluminum Co. of America.

endure distribution to any part of the world, and long periods of storage under the most unfavorable conditions without undue deterioration in appearance or in content.

Since that time, the tin content of the tube has been reduced to not more than 3 per cent for certain products while tubes for other products are permitted to use no tin. These restrictions, where tin is permitted, have led to many combinations for the slugs used in making the tubes ranging from pure tin coatings on lead through tin alloy coatings on lead to an alloy where the tin is distributed throughout the lead in the entire slug. Where tin is not permitted, the slug may be made of lead or a lead alloy. These slugs can be run on the same machines that were formerly used for producing tin tubes.

These changes in the slugs and restrictions on ingredients used in decorating the tubes have introduced many new manufacturing problems. The recent trend to eliminate lacquer on the outside, in order to conserve labor, has not helped the over-all problem.

At present some aluminum tubes are being used. These tubes require additional equipment for annealing and they cannot be produced on those presses designed for the tin tubes. They are giving satisfactory service.

Many substitutes for collapsible tubes have been developed including side walls made of paper, plastic, metal foil and various combinations or laminations. Many of them have been subjected to extended tests and some have been consumer tested or placed on sale in test towns. It is entirely within reason to believe that some form of substitute tube may soon be on the market, but, to the best of my knowledge, none are now being offered.

In the postwar period, we expect a general return to the use of tin and aluminum collapsible tubes. Lead tubes are not an innovation; for they were in use fifty years ago and during the prewar period their production amounted to some 5 per cent of the total.

Conclusion—Modern packaging is complicated; if we accept the obvious solutions we can expect trouble. A proper package is not developed all at one time but is the result of a series of gradual improvements. Test, test and test again seems to be the proper approach.

We are always interested in new ideas, materials and methods and we are willing to spend the necessary time, effort and money in order to determine the application to our products. If one out of every one hundred is adaptable to our use, we feel that we are exceptionally fortunate.

With the return of prewar conditions, every effort will be expended to improve existing or prewar packages rather than to return generally to the package which was formerly used.

Photographic supplies

By Kenneth R. Marvin

What will the user of packaging materials choose when selection is again possible? The wartime period of shortages, substitutions and government specifications has resulted in the development of saran, V-1, X-crepe, A-12 and A-50, strip-coat and many other packaging materials. They have proven valuable, many of them unique, in delivering the goods in a usable condition. I think, if we may use a well-worn expression, "American ingenuity" has accomplished great things in handling this extremely difficult job. However, in looking ahead to the time when shortages and substitutes will be an experience of the past, let us consider the qualifications and the limitations of the several groups of materials used for packaging products. Are these "new" materials going to remain? Are the "old" materials going to return?

I believe, in making an analysis such as this, two things must be kept in mind.

1. The packaging of goods for the peacetime market will be highly competitive and for this reason the cost

XUM

of packaging will have a considerable bearing on the selection of packaging materials, equipment and methods.

2. Probably only in rare instances will packaging be required to withstand the rigorous conditions demanded of it during wartime. Rather there will be considerably more emphasis placed on the appearance of the package, how it will merchandise, what convenience it offers.

Assuredly the packaging of the future must protect the product to a much higher degree than prior to the war. But no longer will this characteristic suffice in itself. This feature will have to be built into a package which will have all the outward beauty and character so necessary to demand the attention of the critical purchaser in a highly selective and competitive market.

I should say that this is going to pose a problem for the package material supplier and the package fabricator. For this reason I believe many of the older materials will come back into use. In many instances they will be combined with the highly desirable characteristics of those new materials which have done such an excellent job of protective packaging.

Paper and paperboard products—Paper and paperboard products are among the few materials that have been more available during the entire period of scarcity. These products cannot be classified as new although there are certainly many new applications for their use. Probably the ultimate substitute for many package users has been the paper bag, box, carton, can, tube, etc. Some of these substitute packages will undoubtedly remain when other materials are again available. Paper has certain characteristics which are desirable. The flexibility of paper offers many possibilities for use which other materials do not allow. Cost will always be an important factor in its favor. Then too, it is assured that there will be a great improvement in the quality of paper and paperboard products. They will be offered with better finishes, higher strength and better colors. Improvement in quality will increase the use of a material which will always find extensive application throughout the packaging field. One example of a new application which is likely to have increased use in postwar packaging is the solid fibre and corrugated V-board shipping case. This appears to offer good possibilities, as a shipping container, for export shipment because of its highly protective qualities, its comparatively light weight and lower cubic displacement.

Laminations and combinations of paper and other flexible films—Laminations and combinations of paper and other flexible materials have seen a tremendous use as a means of protective packaging during the war. Although by no means unknown prior to the war, these combinations were relatively few and were used largely in a decorative way. Further development should be expected in this field which will combine the highly protective characteristics with attractive appearance. For example if the proven characteristics of the well known X-crepe pressure seal bag can be dressed up for the civilian market there seems to be many potentialities.

Glass containers—There will always be many applications in which glass packages are not only preferable but absolutely essential. However the factors of excess weight and high breakage are objectionable. These two important characteristics of glass will undoubtedly compel many users to revert to metal packages as soon as they become available. At a recent meeting someone said, "Why not an unbreakable bottle?" Well why not? And at the same time if the weight can be further reduced many new users of glass would not quickly change back to the former "tin can." It can be pretty well agreed that the well sealed (unbroken) glass package gives about the ultimate in protection, and there are very few products which are not compatible with glass.

The foregoing comment on the superiority of the glass package for certain products from a protective standpoint puts a lot of responsibility on the closure.

Closure materials—Closures made from metal with cork or rubber liners have been used widely in the past and will undoubtedly be used extensively when these materials are again available. Plastic closures which retain their uniformity and do not crack under strain or break upon dropping are good. Wood and paper closures, because of their lack of stability, are the least satisfactory. Screw closures are more positive and easier to reseal than a press fit or friction plug type closure. Closures on many packages should be improved in both appearance and utility. They should be so designed and finished that they do not readily collect dust and dirt, nor should they be subject to corrosive action of the contents of the package. They should be readily removable and reclosable to a degree which will ensure as nearly as possible the original seal produced by the manufacturer packing the product.

Metal foils—Metal foil is an excellent packaging material both from the standpoint of protection and decoration. The promised lighter weight foils free of pinholes will have widespread application. Thermoplastic coating

4—After standardization requirements are lifted, a return to such private molds as these is considered a "must" for wine and liquors.

4



on foil provides efficient means of fabricating a package of high protective quality. Laminations of foil to transparent sheeting or paper adds strength and good printing surface. This makes possible the use of a very light weight foil resulting in an economical package with a high degree of protection and an attractive appearance. This combination of materials lends itself readily to many types of automatic packaging. A successful application for such material is the packaging of small amounts of hygroscopic powders in a packet fabricated of thermoplastic coated foil laminated to printed transparent sheeting.

Metal containers—From the standpoint of economy, ease of handling on either manual or automatic packaging lines, high degree of protection to product, good appearance and convenience of use, it is difficult to better the metal container as a package. Everyone will agree that as soon as possible metal will again be used extensively as a packaging material. Metal containers are of considerably lighter weight than glass packages of a like capacity and they are not subject to breakage. Therefore the problem of shipping is simplified and less expensive. Certain improvements in metal containers may be sought in the postwar period. A better closure to replace the friction top will give better protection and greater convenience. There is a need for inner coatings which will offer a wider range of use of metal containers for certain liquid products, which react undesirably on the present standard coatings. Aluminum containers were in use to some extent prior to the war. This was particularly true in the case of the smaller extruded tube-type packages. Of course everyone is familiar with the aluminum beer barrel which was introduced just prior to the war. Here it appears is a definite possibility for extensive development in the metal container field. Light weight will be a decided factor in favor of aluminum particularly on large size packages for liquids. Export shipment and particularly air shipment will put a premium on lightweight packages. If the cost of aluminum is reduced, as is expected, this material may offer some of the more common prewar metal containers keen competition.

New substitute coatings and linings—New substitute coatings and lining materials for metal containers have proven highly satisfactory from many standpoints. However, there appears to be a need which has not been entirely answered. That is the development of a coating other than tin which will lend itself to soldering. In a recent article[1] mention was made of the fact that certain of the metal containers captured from the Germans showed that they have been electrically welding the seams of some containers. Whether or not this offers any possibility in the fabrication of metal containers is for the can manufacturers to decide. Certainly our recent experience resulting from the scarcity of tin should have stimulated investigations with interesting results.

Collapsible tubes and substitutes—Unless either a plastics manufacturer or some other material fabricator contributes an outstanding development it would seem certain that the metal collapsible tube will again come into its own. The substitute packages for collapsible metal tubes, other than the plastic tube, have been either paper, glass or paper and metal combinations. In some cases the substitution of paper or paper and metal packages for the collapsible tubes has necessitated a change in the form of the product. The most notable example is the change from tooth paste in a collapsible tube to tooth powder in a paper package. Unless the public likes powder better than paste, a rapid change back to the collapsible tube seems inevitable. In the case of a change from the collapsible tube to glass, as for example packages of shaving cream, oil colors, etc., no change was made in the form of the product. However, from the standpoint of convenience of use there seems no reason to believe the collapsible tube will not again be offered.

Conclusion—In conclusion it can be said there are a number of factors which determine the use of any packaging material. In forecasting which materials will have continued use in the postwar period these factors must of necessity be taken into consideration. Therefore, any general statement as to what the trend is likely to be is just that—a very general opinion which must be weighted by the specific requirements for specific problems. For example the type of product will affect greatly consideration given to various materials to be used in packaging that product. Such factors as the physical shape, size and weight of the product, the amount and kind of protection required and the form (liquid, powder or solid) of the product have an important part in the preliminary consideration of which class of packaging materials can be used. Then there are the all-important production considerations such as whether the packaging is to be performed manually, semi-mechanically or on a fully automatic packaging line. Also, there are such other production problems as the working conditions under which the operation is to be performed. Packaging products under conditions of total darkness is perhaps one of the extreme examples of where production requirements have an important bearing on the selection of packaging material and equipment. The humidity and temperature requirements for the product being packaged are more common considerations. Finally there is the very important question of what the packaged product will be required to withstand to reach the ultimate consumer. Here careful consideration must be given to shipping methods, storage conditions, merchandising and consumer convenience.

Each individual packager will not only give careful thought to the above mentioned factors in determining whether to revert to materials which have been scarce or to continue to use some of the new materials, but will also be influenced in his decision by the knowledge and experience he has gained in packaging problems during the war. This knowledge and experience has been widespread throughout the industry and will be reflected in the postwar period by many innovations in the packaging of products for civilian peacetime markets. Not only has the emphasis placed on the importance of packaging during the war been apparent to those engaged in this work, but the general public has been educated to look critically upon the way in which a product is packaged.

[1] Modern Packaging, October 1944, "German Cans," p. 126.

XUM

The place of research

Testing package material

by Dr. T. M. Hill and D. B. Strohm

Scientific investigation has taken the place of hunch and guesswork in deciding policies and mapping plans. When competitive merchandising returns, that approach will be even more essential. Of the many subjects of research and investigation, those of chief concern to packagers are (1) the properties and protective values of materials offered for packaging; and (2) the determination of consumer acceptance and point of view. The two call for different personnel and equipment. Both are discussed here by authorities in their respective fields.

It is more important to carry out research than to pay dividends. This statement was made by a prominent industrialist in deep depression days of 1932. Its veracity has been tried and proven—especially during the past three or four years. In fact, results of intensive research during this crisis have been so astounding that we might be tempted to reiterate the thought in a new light—it is important to carry out research in order to pay dividends.

Certainly packaging progress in the approaching peacetimes will depend more than ever upon research. The packager will have many new materials at his command. Investigation of the characteristics of these materials and adaptation of them to packaging problems represent an immense task. It will be necessary to understand not only the properties of each individual type of paper, plastic film or metallic foil used, but also the aggregate characteristics of the countless possible combinations.

Naturally, the selection of package material must be suitable for the product to be protected. Research must begin by a thorough analysis of the product, its composition, and its properties. Once the requirements of the product are understood, attention may be directed to finding packaging material of proper specifications.

Intelligent application of research, during the past 40 years has brought packaging a long way toward its ultimate goal. The evolution of cracker merchandising is a good example of this. In Grandfather's time, the cracker barrel was an "institution" in the general store. Now we can buy our crackers fresh, clean and crisp in packages that are resistant to moisture penetration.

Two generations ago package requirements were simple and protection standards were rudimentary compared to our rapidly rising standards today. There was no elaborate equipment nor was there a well organized system of testing. Packagers did not have the backlog of experience or the wealth of data which we have acquired. Nevertheless, even in the cracker barrel era, a certain amount of research was necessary.

Similar research has followed the whole pattern of packaging progress, each year bringing its quota of refinements. The first paper bags were a far cry from the present product. Treatment of wood pulp to make better paper was one step in the right direction. Later came various liners of plastic and foils, more effective adhesives and refinements in printing to give the bag more eye appeal. The importance of the paper bag in everyday life is realized when we consider the total annual prewar consumption in this country—about 50,000,000,000 bags.

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1—Improvement in the sterile, fully protective and convenient packaging of drugs has been a major factor in their efficient use on the battle fronts. Research in materials and in methods of packaging penicillin have kept pace with the development of the drug itself. Here stoppers are placed in vials of penicillin at the plant of Commercial Solvents Corp.

The development of the cardboard box has likewise been aided by research. An important step was the teaming up of cardboard with other material such as wax paper and foils, to give the box better characteristics.

In many cases the product itself has been the chief factor in determining the shape of the container. Packaging experts have had to consider the density of bulking value of the product, its abrasive properties, chemical characteristics, oil, grease and water content, and its tendencies to form gas under certain conditions.

Often geography has played a part in deciding the type of package needed for a product. Hot, humid latitudes present packaging problems not encountered in the more northern climates. Sometimes, a product must be packed for all-climate service—the small plastic-coated aluminum foil packets that carry powdered coffee and dehydrated lemon powder to our armed forces all over the world are examples of this.

In recent years, the moisture content of packaged materials has become a matter of prime concern to manufacturers. In some cases the moisture content of the product must be held within relatively close limits to maintain palatability, flavor and other properties; in other cases the product must be kept as dry as possible; in still other cases the package must withstand total immersion in water for indefinite periods without spoilage of the contents. For all of these tasks, there are available a variety of materials which range from fibrous products such as paper—which have little resistance to penetration by moisture—to the metal foils which are completely impervious. In between, are materials varying widely in their resistance to moisture penetration. In addition to selecting the material, there are also the problems of constructing the package and sealing it.

In this connection some packaging materials, such as paper, are susceptible to moisture penetration through pores. Many of the synthetic films are not porous in the ordinary sense but, because they dissolve moisture, carbon dioxide, and other gases and vapors, they can still be penetrated by diffusions through the film.

Much work in the standardization of tests and the accumulation of data on chemical properties of packaging materials will be necessary in the postwar era. The latter includes water-vapor permeability; permeability to fixed gases, air, carbon dioxide, oxygen and nitrogen; permeability to organic vapors; and the penetration of water, oil and grease. Also important are problems of aging and the specific effects of temperature, oxidation and light.

The mechanical requirements of tomorrow's packages will present an additional set of problems. Mechanical tests of the package by compression, tumbling and impact must be defined and standardized. The final tests will include most rigid examinations by packaging experts carefully trained to detect even minor imperfections.

It is a logical assumption that improvements in packaging are simply a matter of applying scientific principles and taking advantage of the modern materials available to packagers. Tomorrow's packages will be scientifically constructed to do an economical and efficient job of protecting products during their transit from producer to consumer, and research will play a prominent role.

Testing the market

by Sam Barton

The producer of a packaged product who has applied scientific research to select suitable packaging materials is still in the early stages of solving his problems. Not only must he consider the severest physical characteristics which any probable market might impose on his product and package, but also the consumer's requirements.

The wise producer is either prepared to carry on consumer research, or he will enlist expert professional assistance. Sometimes it may be well to indulge in both

2



2—Research has been responsible not only for the growth of such revolutionary concepts as packaging everything from soup to ointments in capsules, but also for the perfection of machines with which to put the concepts into practice. Here Robert Scherer, inventor of the rotary-die process, is shown with his capsule machine. Photo, Gelatin Products Corp.

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3—*Market research reveals the major role of consumer convenience in the success of a package. Dairy products, formerly sold in bulk, are now protectively prepackaged in units of convenient size bearing brand names, and they are displayed in well-lighted refrigerators near related items.*

activities for purposes of a complete consumer checking.

Consumer tests are often of great value in determining package construction and design. These tests are usually based on comparative observation under specific conditions, and are likely to be most successful when the testers are compensated for their reports.

Consumer testing will often help to avoid an impractical package. It will facilitate decisions in cases of compromise between appearance and practicability.

Some of the most obvious points to be considered are that the package be small enough to be stored easily in the average home, small enough for the housewife to carry with her other purchases, small enough to fit the amount of money that the consumer can lay out from a weekly paycheck. At the same time the unit must be large enough to be economically packaged, sized to fit the customary shopping frequency pattern and the normal consumption rate, and small enough (or protective enough) to avoid waste through spoilage.

Most manufacturers would do well to know more about the facilities, the range of average humidity and temperature in consumer storage cabinets as well as possible hazards due to discrepancies in equipment.

Increasing self-service selling makes it essential that the package clearly announce the type of product it contains. A box containing crackers should be plainly labeled. The buyer must be reminded to buy crackers first and to buy a particular brand second.

A well-identified brand assists the buyer either in remembering "that's the one I want," or "that's the brand I'll never buy again." Family brand identification can be aided through package design by color, type styles and package shapes. If a new package is a member of a family brand, it should be immediately recognized as such by the consumer. It is imperative to find out if a new package creates a deep and clear impression—a picture of the label that the consumer can easily visualize in his mind's eye. The relative ability of several packages to do this can be estimated through simple comparison interviews with a small cross section of the customers and a careful analysis of their reactions.

Certainly a great part of its selling job is done if the package design succeeds in clearly identifying both the commodity and the brand.

But it can also stimulate a desire to buy regardless of real need for the product—especially if the package is a dispensing device. Another important factor, which can be developed tremendously to create brand loyalty and perhaps to step up consumption rate, is the secondary use of the package—for example, the beverage glasses in which jelly, cheese and luncheon spreads are packaged.

The package itself can sell the ideas of quality, sanitation, purity, etc., and its ability to do so can be tested through consumer interviewing.

A package can frequently sell if, through use of pictures, menus, recipes or suggestions on the label, it can answer such questions as: "What should I get for dinner tonight?" "What should I get Amy as a gift for Valentine's Day?"

Closely allied with the idea of selling by providing menus, recipes, etc., is the function of basic instruction in the use of product and package. Research has revealed that few are properly written or illustrated, that most are never read at all, that people still break the turn keys of fish tins and open cracker boxes at the wrong end. The use of good diagrams or pictures supplemented by short visible copy has been found most satisfactory.

Instruction can be easily tested, but requires that a cross section of potential consumers make the test. The investigator notes the tester's mistakes in following direc-

tions and discusses the directions with the tester to find out wherein they lack clarity.

The informative label on a package should report the facts—but they must be understood. This can be facilitated through testing the wording, but may well require supplemental education through an advertising campaign.

When a major problem is known or suspected to exist which might be solved through research, a field study is indicated. After preliminary studies and checking for previous data on similar problems, it can be determined whether a small-scale study or a full-scale regional or national survey is necessary. It may develop that the problem can best be handled through the use of some of the specialized research techniques—consumer jury, test store audits or consumer panels.

Many large corporations have extensive research staffs and budget as much or more for market research as they do for product research—and many flagrant marketing and packaging errors are thus avoided.

Every manufacturer should have a consumer research department. If necessary, it can start out as a one-man affair. A good basic research unit would (1) collect, analyze and digest outside research studies; (2) abstract pertinent data; (3) represent the consumer's point of view in any management meeting; (4) conduct small-scale field surveys where a few hundred local consumer interviews would assist in answering the marketing problems—protection against any flagrant marketing or packaging errors; (5) plan, pretest and direct full-scale professional surveys; (6) analyze and interpret the results of any continuing research services.

Including the services of a $5000 to $10,000 a year research director, a librarian-secretary, a statistician-chartist, two interviewer clerks and operating expenses, the annual budget for such a basic research department might range from $11,500 to $18,800. Such a department, if staffed with versatile people, could handle practically any type of general market research problem as well as the specialized ones of package design research, even though it might not be able to undertake full-scale studies.

If it is determined that a problem requires professional research agency assistance, however, two or more agencies should be called in for discussion of the problem, paid a flat fee for consultation and for making their recommendations as to the methods, procedures, questionnaire forms, etc. When full specifications for the study have been drawn up, bids should be asked for, and such bids should be based on an assumed average production rate, with the cost being increased or decreased in the event that the actual survey should have a lower or higher production rate when extended to a national basis. When the basis is uniformly understood by all concerned, such bidding is eminently fair to all.

Important to look for in a research agency are a research director experienced in previous studies of the type required on the particular problem, a permanent staff of field supervisors in major markets, salaried staff of interviewers, permanent staff of coders and editors, staff and facilities for manual and mechanical tabulating, and highly trained mathematical statisticians.

Having selected the research agency, there should be a full discussion of the projected form of the final report and of the methods of application of potential findings. Dummy tables and charts should be prepared to avoid opportunities for misunderstandings, to force all of the decisions that are better made before than after the field work is completed. After the survey is completed, new factors, requiring special analysis, are handled easily.

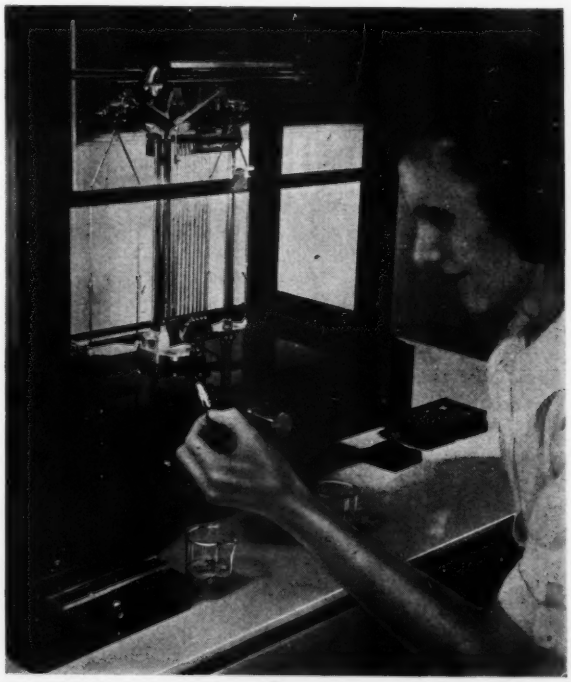
Necessarily, much of the discussion of research on package design applies as well to product testing and to consumer research in general. It is logical to prophesy, therefore, that the company which is equipped with a basic consumer research staff, in addition to its regular technical department, will be in a position to take full advantage of research as a substitute for guess work.

4—Investigation has shown that the customer likes handy unit packages of branded goods. New machines and materials meet the demand. Photo, Ivers Lee Co. 5—Testing is an important aspect of research. Here capsules are weighed to assure accurate fill. Photo, Gelatin Products Co.

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XUM

Unsatisfied machinery needs

During the past few years it has been impossible to obtain even the commonest packaging machinery for products which are not of prime necessity and on high priority. Consequently, during this period, the production of packaging machinery and equipment probably dropped to less than 20 per cent of its normal volume. Producers of modern packaging lines have sharply realized their dependence upon machinery and equipment because of the abrupt curtailment of supply. They have had to resort to sheer ingenuity in makeshift to keep their lines in operation at all.

Many problems of readjustment will be attendant upon the resumption of regular civilian production. Just what all these problems will be, and how they will be solved, remains to be seen. Significant indications, however, may be derived from the quotations which appear in the following paragraphs.

These are the responses of a number of production executives to whom MODERN PACKAGING presented a questionnaire for survey purposes. The companies surveyed were carefully selected to include operations under representative conditions in the following lines: food products, drugs and pharmaceuticals, proprietary remedies, household articles, explosives, photographic supplies, meat, toiletries and cosmetics, liquors, radios and parts, chemical and building materials. The questionnaire sent to these producers was the following:

I. If you could get prompt delivery, what packaging equipment would you install—first—second—third?
II. What special *new* needs as to packaging machinery have developed in your plant?
III. What improvements would you suggest in existing machines?
IV. Do these suggestions come (1) from your experience with new materials, or (2) from new production speeds, requirements, etc.?
V. What have you been doing to "get along" for the duration?

Most essential machines

Answers to the first question are laconically summed up in one characteristic response, "Practically all machines will need replacing after the present emergency." This is borne out by specific mention—not once but many times—of the following:

Labeling machines—automatic and semi-automatic
Collapsible tube fillers and closers
Wrapping machines for small unit packages
Cartoning machines
Fillers for dry products
Fillers for liquid products
Capping machines
Crimping machines
Automatic bottle unloaders and packers
Cellophane-wrapping machines
Envelope forming-filling-sealing machines
Case sealing machines
Automatic wrapping equipment for sensitized sheet
Automatic scales and sewing units
Automatic feeding devices for carton gluing machines
Bottle cleaners for alcoholic liquors
Automatic coffee bagging equipment
Automatic applicators for secondary closures
Automatic strip-stamp machines

Unsatisfied requirements

Answers to the second question constitute a challenge to the manufacturers of packaging machinery which—judging from their past records—they are fully qualified to meet. Implicit among the requirements are two factors: first, that the productive economy of this country will be fully prepared to run in high gear; and second, that highly mechanized lines be developed which will tie up fewer operators so that the human element can be released for more important occupations. This will be vitally important in the vastly increased output expected from America after the war.

Some unsatisfied needs are:

1. Equipment for rapid and automatic filling of ampuls with powders and liquids
2. Machines for cord-tying odd and variable shaped packages
3. Simpler and quicker mechanisms for crimping metal containers
4. Unscrambling tables and conveyors for jars
5. Automatic weight controls for close tolerance detection in small jars (⅛-, ⅝- and 1-oz. capacity)
6. High-speed mechanisms for envelope filling and closing
7. High-speed and economical automatic machinery for filling liquids and powders under completely sterile conditions
8. Automatic equipment for sealing large-mouth jars
9. Automatic equipment for stuffing, banding and closing of such products as frankfurter sausages
10. Machines for automatic operation on moisture-vaporproof packaging materials
11. Automatic marking machines for coding and dating packages
12. Mechanical means of applying kraft tape to bundled building material in sheet form

One answer deserves special mention. It is that of a distilling company which calls for improved machinery for the automatic and rapid application of secondary closures. Such secondary closures are imperative in pre-

venting tampering, pilfering and various hi-jacking operations. To date, nothing satisfactory has been offered to take the place of hand application. The secondary seals, the distiller points out, ought to be dried quickly and neatly and still be explosion proof. The drying speed must be sufficient to set the seal firmly within 6 ft. and at a rate of about 120 bottles per minute. The following are some more of this distiller's specific desires:

1. Automatic equipment to unload bottles from shipping cartons and feed them singly to the cleaner
2. Synchronization of all equipment to maintain positive control of each bottle during the entire packaging operation
3. Device to detect and reject bottle caps without liners
4. Automatic mechanisms for packing shipping cartons at end of packaging line
5. Automatic inspection devices (perhaps using the electric eye) to inspect the product for clarity, rejecting filled bottles that are below standard

Suggested improvements

Unavoidably there was some overlapping of answers to question II and question III. Again, however, there was no foggy thinking in the answers to question III since very few of those who responded resorted to generalities.

One production manager anticipates more complete streamlining of all filling equipment, "not only in so far as the finish of the machine is concerned, but toward the elimination of a good deal of the weight in the present moving parts." Another suggestion calls for powder fillers that are "fast, accurate, easily cleaned and easily changed." Another comment is that powder fillers should be designed to prevent spilled powder from getting into the mechanism. Another remarks—with a slight trace of acid—"I have never seen what I would call a good powder filler." "Capping machines," says another, "could be lighter in weight and easily portable." Other calls are for:

1. Development of new machines for wrapping bottles in transparent wrappings
2. Can washing equipment
3. Fully automatic crimping machines with speeds up to 80 units per minute
4. Timed brakes (in continuous slicing machines) to eliminate auxiliary weighing
5. Mechanical detectors to stop machinery when materials (such as caps, transparent wrapping films, etc.) are defective or become jammed
6. More uniformity of application torque (screw capping equipment)

Labeling machines come in for their share of constructive criticism. Whether attainable or not within the limits of practicality and economy, here are the desires expressed for future improvements:

1. Cleaner operation of labeling machines
2. Labeling machines should have exact registration of label, avoiding excess glue around the edges
3. Devices should be improved, for feeding labels properly in and out of label racks
4. There should be automatic trips provided for semi-automatic labelers

"Present bottle labelers have either one of two main faults," says one critic. "One machine puts the glue film on the bottle, then, by a second operation, places the label on the glue film. Another machine puts the glue on the label first, then places the glued label on the bottle. In the first case, it is practically impossible to register the glue film and the label exactly in the same position; the result is either that bottles have glue smudges or that the label edges are loose—or, in many cases, both. In the second case, the result is a package on which it is impossible to eliminate 'picker marks,' that is, slight tears at the four points where the label is held in the magazine."

It must be remembered that many of these production executives are competent engineers. Suggestions like the following qualify them as such:

"Constant motion of the rotary type could be used more extensively in connection with inverted air bottle cleaners (if no indexing is required) as well as on labelers and tube fillers."

"Can't the engineers and designers plan on fewer wearing parts and fewer adjustments?"

"We look forward to the development of standard packaging equipment for use with the many new types of packaging materials that require such special treatment as heat sealing."

"Machines should be so designed as to make for easier repairs and replacement of parts."

"Most bottle cleaners which employ compressed air as the cleaning medium either do not use a long enough air tube to introduce the air blast beyond the shoulder of the bottle, or else they do not have a closed air system and thereby permit foreign material to enter with the air. Further, the lubrication systems are designed in such a manner that frequently oil or grease comes into contact with the air tubes, thus collecting lint or other debris on these tubes and the dirt later appears in the bottles."

"Present filling machines can be improved by designing a dripless filling tube."

"Expensive or revenue-paying products that demand accurate filling would make good use of a device which ensures a simple and quick method of accurate setting and changing the fill-height."

"We'd like to see somebody present a relatively small filler, either a 21- or a 24-tube machine that can operate at the rate of 120—130 quarts per minute."

"Could cappers be constructed, synchronized with fillers, so that the discharge turret of the filler serves as the intake turret of the capper?"

"It would improve cappers to put the hopper at the base of the machine and provide a vertical bucket conveyor to lift the caps to the sorter."[1]

"A good fool-proof and dependable system of indexing round bottles would be very welcome."

"Strip stamp machines must be improved so they will

[1] This idea was put in actual practice, by means of a device contrived by themselves, in the plant of the American Molasses Co. See **Modern Packaging**, August 1944, p. 96.)

XUM

be capable of greater speeds and wider variety of sizes."

"An efficient transfer-plate or disc—or other method—to transfer bottles from a table conveyor belt to a bottle packer would be welcome. This is not as simple as it sounds—bottles tend to stick to the rubber, and the transfer apparatus must not dig into the belt."

"Carton sealers should be made so that they can handle at least a day's supply of cold dextrine glues and be used intermittently without clogging."

Source of suggestions

There is ample evidence that these suggestions come not from any theoretical or superficial observation, but, to the contrary, grow right out of the actual experiences of the production departments in the many lines of business surveyed. In response to question IV, as to the source of these desires for improvements, came the following:

1. Higher speeds required by present-day conditions
2. New packaging materials which the field is obliged to use as a result of shortages
3. New production requirements as imposed by emergency conditions
4. Imperfections in standard materials growing out of wartime difficulties
5. Difficulties attendant upon uncertain labor
6. Changes in marketing procedure
7. New standards of quality control

If proof were needed that there is intense interest in the subject matter of a questionnaire like this, it could be found in the voluntary remarks and comments made not in direct answer to any question but obviously "to get a load off the chest" of the one who filled out the blank. For example, here are some observations which do not fit into any of the questions which were asked, but which very definitely are thought-provoking:

"Our greatest trouble in the future will be in selecting equipment which is really modern and not some 1941 stuff dolled up with a few new gadgets."

"We have not had to worry too much about new material—unless you consider the poorer quality as new. This poor quality will not be tolerated once the emergency is over."

An interesting sidelight on the mechanization of the packing industry was furnished by the following: "If you classify mechanical aids, devices and fixtures which aid hand packaging as machinery, there is a need for this type of equipment in small manufacturing units, rather than for expensive automatic equipment. The setup of the packing industry is not always well understood. Frequently, suppliers waste a lot of time and money designing machinery and materials before they learn that even a big concern may be a collection of little units rather than one big operator."

A distilling company presents this interesting challenge to the industry:

"Produce a good argument to induce the Federal Revenue Department to sanction revenue stamps lithographed on pilferproof or tamperproof roll-on caps, permitting two operations to be combined. The Federal stamp should be lithographed around the cap in the plane of the cap threads so that it will not be necessary to 'spot index' the closure. The breaking of the cap seal by the consumer will effectively destroy the revenue stamp."

The above is hardly a problem which can be solved by the machinery manufacturer, but its successful solution would be welcomed by more than one hard liquor distiller because it would effect more rapid and efficient production line operation. Subsequent savings could be passed on to the consumer without any revenue loss for the government.

Wartime improvisation

Volumes of achievement are represented in the answers to the last question. Typical of most situations is this: "Much of our equipment is now quite old, and we have just kept it repaired pending ability to replace with new modern equipment."

"As is undoubtedly the case with other manufacturers," writes the production engineer of an internationally known concern, "we have had to resort to hand labor in some cases to carry on our packaging under wartime conditions. This was necessitated by use of substitute and new types of material as well as entirely new procedures in protective packaging."

Typical of common experience are these: "We have been rebuilding our own machines as they break down." "We have been obliged to use makeshift equipment of our own development."

Additional inspection, increased manual operations, reduction of productive output—these stories are repeated with minor variations throughout practically all the industries which reported. There is another side of the picture too: from the hardships and difficulties of today comes promise of future progress. Listen to this statement from a user of machinery:

"We have been doing a tremendous amount of research and experimentation, although in both of these activities we have been somewhat limited by war restrictions and manpower shortages. We have also made our wants and needs known to most machine manufacturers and have urged them to develop the machines needed to meet our future requirements. Any new equipment or ideas developed by our own staff have been made available to all machine manufacturers, or to our industry in general."

"Just making the best of it," is the blueprint for 90 per cent of the package production lines today. It goes without saying that conditions in our country, bad as they are, are infinitely better than those of the rest of the globe. Our refusal to tolerate these conditions for long is proving an important factor in speeding up all productive effort, to hasten the end of the war so that our activities may return to the normal pursuits of peaceful and useful civilian production.

When that time comes, the unsatisfied needs of today promise intense activity for manufacturers of every type of packaging machinery. The products of this country will be needed in record-breaking quantities. It is not too soon to plan on rehabilitating the productive machine to take care of the load.

New shipping practices and conditions

by Frank Korinek

Drastic changes taking place in mechanical and automotive fields are bound to be reflected in shipping practices and methods of freight or express transportation. In another chapter of this volume, existing phases of shipping are fully defined and discussed. See *Packing for Shipment*, pp. 759—818. This article will be focused upon the progress made in handling merchandise, and upon possibilities for future improvement.

Types of carriers

Robot controlled rockets—Even before manually operated planes were recognized as efficient means for handling freight, some enthusiasts anticipated the use of the robot controlled rocket for transportation purposes. When Germany launched her V-2 speed rocket, these individuals immediately saw possibilities of transforming this type of carrier from war to peacetime utility. Reports maintained that such a rocket could travel on a beam, from New York to Chicago, for instance, at a rate of speed which would permit a manufacturer to move merchandise from his New York plants to an ultimate consignee in Chicago within two hours. To put it another way, a tree-ripened banana plucked in Florida might be eaten in New York three hours later. Obviously, products transported in this manner would require special containers and special packing. Regular handling of merchandise by means of robot controlled rockets appears to be a distant eventuality, but it is not wholly impossible that this method of transportation may be utilized to some extent in the approaching peacetime era.

Air freight—The first regularly scheduled all-cargo plane made its first flight on October 15, 1944. This first air freight plane left LaGuardia Field and thereafter regular scheduled service has been maintained and should be maintained in the future. Air lines have been quick to sell potential users the value of air freight. Among other advantages they have stressed the fact that containers do not have to conform to the rigid requirements imposed by other modes of transportation, thus indicating a saving in cost. However, unless the manufacturer intends to use air freight exclusively, his containers must meet the requirements of all types of transportation. In other words, railroads will continue to handle more than 90 per cent of average freight and therefore containers must conform to rail requirements. It would not be practical for a manufacturer to purchase two different types of containers, one for rail transportation and one for air transportation, without knowing (when packing merchandise) which method of transportation will be used. Regardless of the type of container employed when shipments are forwarded via air they will receive a minimum of handling. Shipments by air are usually handled individually, each package properly identified and checked from the time it leaves the consignor's warehouse until it arrives at the consignee's door. By this method there is obviously less handling involved than by other methods.

Rail transportation—Wartime activities have served to augment transportation by rail. In addition to this increase in traffic, railroads have been forced to sustain an extra burden imposed upon them by the discontinuance



Air lines have been quick to sell the idea of air freight to potential users. Among other advantages, they stress the fact that containers need not conform to the rigid requirements which are imposed by other methods of transportation and that savings in packaging costs are thus possible with air freight. Photo, United Air Lines.

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of a number of truck lines. Thus rail carriers have been taxed to the limit. All things considered, there has been a minimum amount of congestion or delay. In fact, the heavier traffic has perhaps helped railroads to increase their package car schedules on LCL shipments, and, in some cases, the time in transit has actually been decreased.

Railroads have permitted manufacturers to forward shipments in containers under relaxed rules. They have learned, however, that the use of containers of poorer quality or of second-hand containers has resulted in greater loss and damage. At the present time, through the Classification Committee, the rail carriers are attempting to have the box and board manufacturers improve the quality of their products. If, however, the raw material supply is not available for civilian use and if no improvement can be made until the war is over, the railroads in the postwar period will insist that the box and board manufacturers revert to prewar standards. All things taken into consideration, railroads will attempt to improve their own service in order to haul and keep on the rails as much of the present traffic as possible. They are well aware of the competition which air lines and motor trucks will offer, and naturally they will take the necessary steps to meet that competition to the best of their ability. Greater coordination with other carriers is also contemplated.

Motor truck transportation—As previously explained, the motor carriers, due to their inability to secure the proper help (principally drivers), lack of materials and inability to replace equipment, have found it necessary to curtail operation. Just prior to the war, several of the largest carriers in the East consolidated. Perhaps this move was a key to the future of truck transportation. The smaller lines may be absorbed by the larger companies, paving the way to more economical operation and better service. The war, however, brought a halt to these consolidations and motor carriers are more or less struggling along doing the best job they can under the conditions. Truck lines, too, are well aware of the increase in loss and damage claims due to the poor construction of present-day containers and to the use of second-hand ones. They are taking a united stand in impressing upon the box and board manufacturers the importance of making necessary improvements as soon as it is feasible to do so.

It is the belief of many that motor carriers will make great strides in improving their service. The key, of course, is new equipment, lighter bodies, lighter and more powerful motors, and, through consolidation, less handling—especially between points where the movement at present is in connection with joint carriers.

Freight forwarders—A freight forwarder consolidates small shipments and has them moved over the rails or highways in truckload or carload quantities. He usually gives the shipper the benefit of the difference between less-carload and carload rates. By forwarding shipments in this manner, some handling in transit is eliminated. Wartime conditions have increased the use of the freight forwarders—especially when considerable distance is involved. The future of the freight forwarder is a little doubtful. However, it is likely he will adopt any improvements pertaining to the handling of freight which may be put into effect by either railroad or truck lines.

Express shipments—All express shipments are handled by one agency known as the Railway Express Agency. This agency may be classified in the same category as the freight forwarder in that it will adopt any new practices or improvements which other carriers may offer in the interests of better service.

Thus, in general, the transportation carriers at present are making some progress. Due to wartime conditions they are limited as to any drastic changes in the method of handling merchandise. Obviously, in peacetime they will incorporate all worthwhile advances brought about by the war.

While the transportation agencies in general have not been able to replace rolling stock, on the other hand industry has been forced to adopt new shipping practices.

Mechanization—This is a mechanized war. We have become mechanical-minded in all respects. To a great extent the prewar practice of handling a finished product after it left the assembly line was through manual labor. Today, however, by the use of conveyors, the finished product literally rolls into the truck or car untouched by human hands. The use of conveyors, elevators and motor driven trucks will increase as priorities for them disappear and military demands for such equipment become less critical.

Pallets—At Army operated warehouses and depots, the use of pallets has been introduced with the result that merchandise is unloaded from inbound cars into storage space, then to outbound cars or trucks without disturbing the unit load. A more general adoption of pallets is therefore to be expected.

Increasing labor saving devices indicate that greater standardization of shipping containers should be forthcoming—not so much in construction and material used, but rather in size and uniformity.

Second-hand containers—The practice of using second-hand cartons, a real wartime necessity, should disappear after the war. In the first place, their re-use involves spot-gluing of the original container. A container which is not glued properly lends itself to pilferage and often the merchandise is either lost or damaged before it arrives at its destination. All concerned are eagerly awaiting the return of the stronger container which, when properly glued, will carry merchandise safely to its intended destination without loss or damage.

Conclusion—Future transportation carriers will move goods faster and with less handling. Shippers will adopt all the new labor saving devices. Boxmakers must be governed accordingly, and must limit the size of their containers providing uniformity to coordinate with shippers' mechanized plants. It is logical that these changes should take place step by step as various progressive experiments in transportation become established methods. The proper time to accept a change must first be determined. Necessary adjustments for its adoption must be realized and intelligently inaugurated. Only thus can progress in transportation be fully utilized.

Back to competitive markets

by Walter F. Crowder

Before we can see what our postwar competitive picture will look like and visualize the magnitude of the job confronting the economic system, we should have a clear idea of what has happened to our economy as it shifted from peace to war.

The outstanding feature of the economic mobilization of the nation for war was the tremendous increase in the dollar volume of the nation's output. The gross national product, that is, the total value of currently produced goods and services flowing to government, to business for gross capital formation, and to consumers, amounted to $197,000,000,000 in 1944 as compared with $88,600,000,000 in 1939.

A substantial part of the increase in gross national product was due, of course, to a rise in prices rather than to an increase in physical volume. The difficulties of disentangling these two factors are very real. But some rough estimate of over-all price changes is of aid in evaluating the economic changes that have taken place since 1939. According to estimates based on various price indices, all prices (producers' goods as well as consumers' goods and services) increased about one-fourth between the years 1939 and 1944.

The translation of current value figures into constant 1939 dollars does not, however, minimize the stupendous size and increase of the gross national product. Physical volume in 1944 was more than three-fourths above what it was in 1939.

A breakdown of gross national product for the years 1939 through 1944 shows that war expenditures rose from $1,400,000,000 in 1939 to $85,000,000,000 in 1944, at which time war expenditures accounted for 43 per cent of the gross national product. Government and private non-war expenditures rose from $87,200,000,000 in 1939 to $112,000,000,000 in 1944. In a sense the war program was superimposed on a record volume of non-war output. At the current rate, war and non-war Federal expenditures are running about $100,000,000,000 per year.

With the cessation of war, government expenditures will be greatly contracted. It is estimated that annual Federal expenditures will be approximately $25,000,000,000 within two or three years after the war and as the military machine gets adjusted to a peacetime basis. This $75,000,000,000 reduction in government expenditures will represent the most rapid disappearance of markets in history.

How can this loss be made up? For it certainly must be made up if we expect to maintain employment and income and if our economic system is to utilize its resources effectively. The answer is of great concern to the producer of packaged goods because he must modify his marketing plans to suit conditions as they will exist, and he must modify his packages to fit his new marketing plans. The situation presents both challenge and opportunity.

There are approximately 15,000,000 non-agricultural employees who are currently working in war production jobs. These workers will be seeking employment in civilian production when the war ends. About half of them are in jobs where they are directly engaged in the manufacture of war material. They will thus have to make complete shifts. The balance, in jobs producing civilian goods purchased for war purposes, may not require such substantial shifts if the civilian market for their products is developed. To these war workers should be added the 8,000,000 or 9,000,000 men who will leave the armed forces when the firing ceases.

Unless these men, leaving the armed forces, are able to find prompt employment, there is serious danger that the demands for consumer goods will collapse and thus the country will be plunged into a vicious spiral of deflation. We can hardly escape some volume of reconversion unemployment, but all steps should be taken by government and business to ensure that re-employment is as rapid as possible and that the facilities for the movement of workers from places of unemployment to places where employment opportunities are available are set up and ready to go when the demand arises.

It is reliably estimated that, with full employment in the postwar period, we can produce 50 per cent more physical volume of goods than was produced in 1940. But we can't produce the goods to give this full employment unless businessmen can sell 50 per cent more than they did in 1940. This means that, across the board, businessmen must raise their sights and lay their distribution plans to do a volume of business much in excess of anything they have ever done before.

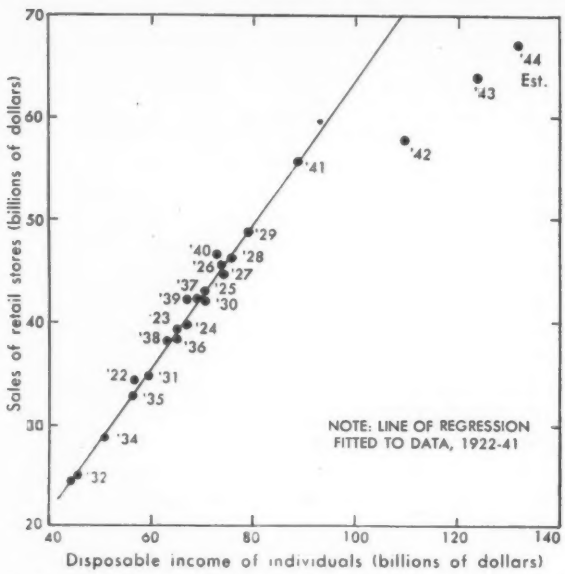
Nor in the return to competitive markets can we overlook the necessity of once more stimulating people to buy by aggressive and intelligent merchandising. If consumers are to increase their consumption rate, goods must be made desirable, smartly designed, attractively packaged, intelligently marketed, and aggressively promoted. The bad habits of wartime must be quickly corrected, the salesmanship of peacetime improved.

The contention has been made that even though we do achieve full employment and do produce 50 per cent more physical volume than was produced in 1940, we cannot consume that much. In order that we may have some idea of what consumers may do in the future, let us examine our past consumption pattern in relation to the spending of our disposable income.

If we consider only the war period, 1939—1944, we note that, although income payments doubled between 1939 and 1944, retail sales did not. About 70 per cent of the entire increase in retail sales between 1939 and 1944 is accounted for by higher prices. After allowing for the price change and for the additional fact that there were fewer consumers in 1944 than in 1939, it appears that the

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Relationship between sales of all retail stores and disposable income of individuals



1—For the years 1922-1941, relationship between retail sales and disposable income for each year fell close to a straight-line trend. Wartime purchases fell short of income by a wide margin due to shortages.

per capita quantity of goods purchased at retail stores in 1944 was about equal to that of 1941. The effect of the war has been, then, to halt the rise in the quantity of goods purchased on an overall basis rather than to curtail the volume substantially.

But this is only the war story. As a matter of fact, consumers would have purchased more goods in this period had the usual variety been available—this is clearly evident on the basis of their past performance and is a strong reason for the belief that we can consume 50 per cent more physical volume after the war.

Over the 20-year period 1922—1941 retail sales and disposable income for each year fall very closely about a well defined straight line trend representing sales-income relationship, as is demonstrated in Fig 1. On the basis of the experience covered, an increase of 10 per cent in disposable income of individuals was accompanied by an increase of about 12 per cent in retail sales.

The persistence of this close correspondence in movement throughout the peacetime period is indeed striking. In fact, the average annual error in sales is only 1.4 per cent while the maximum error (which occurred in 1940) is only 4 per cent. This means that the change in consumer income is, as retailers have always known, one of the most important factors that retailers need to know in determining the postwar outlook for their business. The significant factor is the very high degree of correlation between retail sales and income.

During the war years, in contrast to prewar years, sales and income have not followed this closely related pattern. Wartime purchases at retail have failed by a wide margin to keep up with the wartime expansion of income. Indeed, if the past relation had held, retail sales in 1944 would have been approximately $85,000,000,000 rather than the $67,000,000,000 which was attained. There is no reason to believe, however, that had supplies been freely available, consumer purchases would not have been in line with the past relation to income.

Fig. 2, opposite, shows that retail sales through stores handling non-durable goods have increased in line with the wartime expansion in disposable income. If sales through filling stations, which have been curtailed due to gasoline rationing, are not included in the total for non-durable goods stores, the expansion in sales closely fits the prewar trend. This reinforces the contention of those who hold that people tend to increase their purchases as their income increases.

Sales through durable goods stores, on the other hand, have fallen far behind the peacetime trend based on the relationship between sales and income. Had supplies of hard goods been freely available, the past relationship would indicate sales through durable goods stores of $27,000,000,000 or $28,000,000,000 in 1944. Actually sales were $9,600,000,000. As we enter the postwar period it will be in this line that the big upward adjustments will undoubtedly occur.

Certainly one of the most favorable factors in the postwar period is the huge volume of deferred demand that has been built up during the war. This demand will go a long way toward filling the gap resulting from the contraction of government war expenditures, provided that adequate plans are made for the production, merchandising and distribution of supplies. Producers should be alert to deferred wants, and the degree of success they achieve will depend upon how quickly and how well they are prepared to satisfy the demands. It is possible that in many cases packaging may be responsible for opening or closing that avenue to success.

The production of war materials has made unprecedented demands on the nation's productive energies. Goods which otherwise might have been made for civilians could not be produced. The production of civilian goods (especially durable goods) which took scarce materials and scarce manpower had to be stopped or severely curtailed. As a result, the normal wear and tear on existing stocks has reduced the number of available and functioning units. People will want to replace these worn out items in the immediate postwar period.

The deferred demand for residential building is of particular significance in the postwar outlook. Not only does the demand for construction materials themselves have a stimulating effect but the building of new homes sets off a series of corollary demands for new furniture, new rugs, new appliances, plumbing and heating equipment, etc. Here again a sizable volume of deferred demand has accumulated during the war. The satisfaction of this deferred demand, of course, would be in addition to the normal demand.

The large number of marriages that have not resulted in the establishment of new homes is a further factor of strength in the postwar housing market. This is also a factor of strength in the postwar demand for all sorts of household supplies as well as furniture, rugs, and equipment. In the decade prior to 1940, the average number

of marriages was about 1,250,000 per year. In 1940, there were 1,565,000 marriages; in 1941, there were 1,679,000; in 1942, there were 1,800,000; and in 1943, the total was 1,638,000. At the present time there are about 1,670,000 more married couples than there would have been if the average prewar rate had not been lifted by the war.

In any event, we are safe in assuming that a large proportion of the 7,000,000 or 8,000,000 couples who will have been married during the war will not have set up housekeeping and will not have purchased household goods and supplies in the quantities they would have liked had war conditions permitted. This will be a source of heavy postwar demand.

Private outlays for plant and equipment in the postwar period, when materials and manpower are again available for civilian use, should be another positive factor in the demand for goods. Private gross capital formation amounted to only $2,200,000,000 in 1943 and $2,500,000,000 in 1944 as compared with $7,500,000,000 in 1942 and a peak level of $19,000,000,000 in 1941. This sharp reduction highlights the extent to which the capital goods flow of the nation has been diverted to the war program.

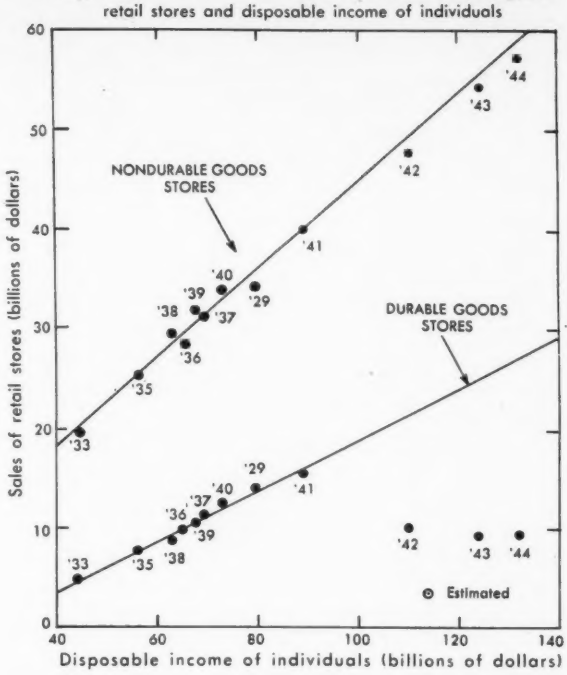
In the four years 1937 to 1940, an average of between $7,000,000,000 and $8,000,000,000 per year was spent on producers' plants and equipment. A comparison of the volume of this prewar average with the low level during the war would indicate another area of heavy deferred demand. Throughout the non-war industries, the normal replacement of capital goods has been postponed wherever possible. Furthermore, no attempt has been made to expand civilian capacity to handle the output of civilian goods which has been considerably in excess of the prewar level. Rather, the increase in output has been achieved by overtime and multiple shift operations.

In the case of the public utilities, railroads, and communications industries, the capital outlays which have been permitted during the war have been only moderately above the prewar rate and are much less than these industries would like to spend. Given anywhere near the present volume of business after the war, they will have both the necessity and ample resources to make some really large outlays.

Farmers have also been restricted in their purchases of new equipment during the war. With a high level of productive employment after the war, there will be a demand for more farm products and there will be more farm income to pay for labor saving machinery.

During the war there has been a decline of more than 350,000 firms in the retail and service trades. As new businesses are started after the war, there will be a very substantial demand for all types of equipment, fixtures, and new fronts to set up these stores and shops. Moreover, a large number of the proprietors of the 1,900,000 firms presently in these trades will make extensive alterations and modernizations. These proprietors will also want to replace equipment that has worn out during the war. In those retail and wholesale lines where war shortages or outright curtailment of production has reduced inventories, there will be a substantial vacuum to be filled before goods can be made available to customers. And, of course, all the new stores will need to be supplied with initial stocks.

Relationship between sales of durable and non-durable goods retail stores and disposable income of individuals



2—Wartime sales-income pattern: sales of non-durable goods followed peacetime trend by expanding in relation to income, but sales of scarce durable goods fell. Here is where postwar adjustments will come.

The role of deferred demand in postwar markets can, however, easily be overstated.

To get the proper perspective, we should realize that the volume of the deferred demand for durable goods is not enough to fill more than a part of the gap which will be left when government war spending is sharply contracted. Again, it is a favorable factor, but it is not enough to do the job alone of supporting a high level of employment. Furthermore, the deferred demands that exist can be largely satisfied in a few years at most. The basic demands for goods generally must come from high overall levels of production. These high levels of production cannot be achieved just by the replacement of durable goods already in the market; they will also depend upon the development and introduction of many new products as well as upon the natural expansion of markets which automatically would accompany high income.

We have looked at possible postwar production and deferred demand built up during the war. This picture would not be complete, however, without a statement of the part our wartime savings will play postwar.

Income payments to individuals have paralleled the increase in the gross national product. This is to be expected since these payments represent the compensation to individuals for the production of the total national output. This greatly increased income of individuals, however, was much in excess of that which could be used to purchase the restricted volume of consumer goods and services. To be sure, the volume of goods available for con-

sumer use has been substantially increased since 1939, but the rise has been much less, relatively, than that which occurred in the flow of income payments to individuals.

Income payments to individuals reached $155,000,000,000 in 1944. This may be compared with income payments of $70,800,000,000 in 1939. Federal and state personal taxes were stepped up from $3,100,000,000 in 1939 to $20,000,000,000 in 1944. Consumer expenditures increased from $63,200,000,000 in 1939 to $97,000,000,000 in 1944, while the balance—savings—jumped from an annual rate of $7,300,000,000 in 1939 to $38,000,000,000 in 1943. The aggregate of savings which have piled up since the beginning of the rearmament program in 1941 will total in the neighborhood of $110,000,000,000, an amount substantially in excess of the entire national income for any year before 1942. And, of course, if war conditions prevail into 1945 the total at the end of the war will be even larger.

The magnitude of these abnormal savings is indicated by comparison with $7,300,000,000 saved in 1940 and even smaller amounts for earlier years. Prior to 1941, individual savings had never reached $10,000,000,000 in any year. Even with present high incomes, they would be much less than the amount indicated above if it were not for the shortage of consumer goods, which has resulted in great quantities of deferred demands which have been accumulated during the war.

Will these savings, accumulated during the war, be a source of postwar purchasing power? The answer to that question is not so simple as it may seem at first inspection. Savings, whether in the form of currency, bank deposits, or war savings bonds, cannot be used in mass to buy goods. The individual may convert his savings into goods, but, for the economy as a whole, the net effect is just a transfer. Someone else must forego the use of the good currently produced in exchange for the funds derived from the savings.

In general, however, the large accumulations of wartime savings may possibly affect postwar purchasing *indirectly* and in a number of ways.

First, for example, even though the portion of total individual holdings of liquid assets which actually enters the market as a demand for consumer goods may be small, it will be in addition to the normal demand which, as always, is being financed by the income payments flowing from current production. At any time, whether we are at a high or low level of production in our economy, the demands for goods must be viewed as being financed by current production. From any level of production below full employment, the injection into the stream of total demand of additional amounts deferred from previous income receipts will have the result of stimulating demand and raising production. Thus, it may be seen that whatever individual savings are used to purchase consumer goods they will have a manifold effect upon the total demand for goods.

Second, individual ownership of increased amounts of war savings bonds and bank deposits can also have an indirect effect on demand in lieu of the actual cashing and spending of the amounts owned. The mere ownership of large savings would enhance the security of individual holders and thus would tend to increase their disposition to spend current incomes.

The influence of these two factors is chiefly to postpone or offset the deflationary forces which will be present in the immediate postwar period.

Third, the existence of large savings might influence the market in certain other ways, but our knowledge of consumer behavior is so limited that predictions are dangerous. It is possible that a consumer with a large pool of savings may be induced to buy more goods of the expensive, durable type than he otherwise would buy. A man with several thousand dollars may be more likely to buy a new house or a new car than the man without any savings who must rely upon consumer credit.

Fourth, the people who cash in war bonds to purchase consumer and producer goods after the war, in whatever volume this may be, may not be located in the same area as the buyers of newly issued bonds. The point is that people in every section of the country will have bonds which they may cash to buy consumer goods while the funds for redemption of these bonds may come from the financial centers where the heavy savers in normal times are located. The same point may, of course, be made when the sellers of bonds are in the low income groups and the buyers are in the high income groups. Such high income groups may, of course be located in a relatively few wealthy communities.

The tremendous war production has resulted in profound changes in the economic structure of the nation. The conversion of the economy to a war basis made it necessary to shift substantial parts of our manpower and resources to war activities. The reconversion to peacetime production will require equally great, if not even more severe changes.

The latter changes will have to take place without the almost unlimited war demand which characterized the conversion period. The job of gearing for war was one of production. The job in reconversion will be one of markets. And markets are people—people who have purchasing power and are willing to spend it.

To be sure, we shall see the most rapid disappearance of a market in history—the government market for war goods. But it will come at a time when we have a far greater accumulation of demand and a far larger accumulation of purchasing power than ever before existed. It may be that people will not use their huge accumulated savings to satisfy their demands. That depends on how their own economic outlook affects their disposition to spend and how successfully improved merchandising helps them to decide to spend their money at the high levels required.

In short—the return to competitive markets is an inevitable sequel to war's end—a sequel we all desire. But while that affords an opportunity, it means the disappearance of a big slice of the present market, which means a challenge. To replace it calls for vastly more aggressive selling methods than we have ever practiced heretofore. This includes better packaging, because packaging is an important element in creative merchandising.



Keeping his trademark before the public, at home and abroad, will be an important factor to the manufacturer in rebuilding his markets. Here American labels may be seen on the shelves of a company store located at the Llallagua tin mine in Bolivia.

PHOTO, THREE LIONS

Rebuilding markets for packaged goods

by Dr. Vergil D. Reed

Packages, trademarks, trade names and slogans are the means of identifying a product, giving it an individuality which sets it off from competitive products. Without this individuality or means of identification which makes consumer recognition possible, sales promotion and advertising effort cannot usually produce effectively, even in a local market of considerable size.

A major purpose of advertising or sales promotion is to impress the package, trademark or brand upon the public mind in such a way that the buyer will associate them with the class of goods to which they apply. Since the package and brand are often the only connecting links between manufacturer and consumer, there are many manufacturers to whom such means of recognition are more valuable than are their plants or patents. What are the problems of re-establishing packaged and branded merchandise after the war? How can recognition and preference be regained and extended?

Some manufacturers during the present war have been fortunate in that the nature of their product permitted them to continue producing at, or even above, prewar volume with little interference in their distribution or advertising, at least in their domestic market. These are the exceptionally fortunate. Most have found themselves faced with shortages of materials, making necessary the reduction of output, changes in formulas, changes in packages, or even the stoppage of production. For others, the government has either become the largest or only customer, with little or none of the product available to the normal market. Still others have had to withdraw one or more of their branded products for other reasons. Almost without exception, normal contacts with foreign markets have been greatly curtailed or cut off. The problems of re-establishing these goods in both domestic and foreign markets after the war, or as restrictions are lifted even before the war with Japan is over, will be extremely great and will call for real marketing strategy. Selling alone will not be enough.

In re-establishing his markets, the manufacturer will not only have to re-establish his products in competition with brands existing before the war. Those products will have to compete with many new ones as well. Many concerns starting as war manufacturers will continue as producers of new civilian products. Other established manufacturers who have added to their facilities will bring out new products and new brands. Foreign producers will be back with both old and new items. Trying to keep them out by insurmountable tariff walls is not the proper solution from a national viewpoint. That is not good business for a creditor nation, unless we want to give away both money and the goods we export. Brand competition will be keen, and those who have relaxed or ceased their efforts with the consumer face a real job.

There is even some basis for fear that those stopped in the production of trademarked product during the war may even face the loss of rights to such trademarks by default in some markets.

There are many lessons to be learned and applied from

our experience during and after the last war. Those happenings as they apply to branded and packaged goods are well worth outlining briefly and chronologically for the light they throw on present and future problems and the solutions they suggest.

By the end of 1915, European manufacturers largely withdrew from our market, as well as from South American and other markets. The European market was also closed to us except for war goods. This brought increased demand for our packaged and branded goods both at home and in non-European markets. We became more export conscious and tried to cash in on the well known "Made in Germany" slogan, so "Made in America" became the darling of the hour. It soon became all too apparent that this over-all "brand" neither signified nor assured quality to foreign customers. Manufacturers' sins of omission and commission, along with war-bred difficulties, unfortunately made a "wayward daughter" out of our young hope in a remarkably short time.

Manufacturers began to discover the advantages of working more closely with their jobbers, who in turn saw greater advantages in selling advertised brands and began to seek such goods. The romance of exporting lost part of its first charm with the domestic market's increasing demands, and new profits were found in promoting domestic substitutes for former imports, ranging from drugs and hats to toys and wines.

Goods soon became short. Many cheapened their products, while others stopped or relaxed their advertising and selling activities. Those with greater farsightedness were responsible for a considerable increase in the "business insurance" type of advertising. This was largely good will or institutional in character, aimed at retaining consumer and distributor good will for the future. This also helped offset the inroads of product substitutions when dealers found their regular brands hard to get in sufficient amounts and helped assure that such substitutions would be temporary.

Our own entrance in the war in 1917 brought increased problems. Government became the big customer. Raw materials—including paper for packages and advertising—became short while demands continued to increase. Manufacturers had to "ration" their civilian goods. Those with war contracts kept up good-will advertising. Those without war contracts stopped featuring products and went institutional, too, fearing that even if they had goods to sell, it would be considered unpatriotic to push them. Here again was the business insurance approach. Salesmen were used a great deal to keep up close relations with trade outlets and cultivate them for the future.

Restrictions brought a considerable standardization program. Lines were simplified to the advantage of manufacturer, distributor, and consumer. Smaller stocks with quicker turnover helped retailers. Improved quality and reduced waste in dealer helps were found more easily attained than supposed. Shortages of materials and shipping space brought many improvements in package design and changes in the materials used in them. Sampling largely disappeared, and ways were sought to improve sampling efficiency when it could be resumed. One of the results of decreased sampling was greater use of color in magazines, catalogs and direct mail, to show the product in a realistic manner.

The self-service store and the cafeteria spread rapidly and grew out of their infant stage quickly. The automobile and truck became sales and distribution "tools" to reach new territories and cover old ones better. Women with their new freedom and participation in business and industry assumed new importance as individual consumers, in addition to their past role of family purchasing agents. This change affected their future purchases all the way from canned goods and cigarettes to silk stockings and electrical appliances. The "emancipated" woman was becoming conscious of her power as a consumer.

With the end of the war in 1918, most manufacturers of packaged and branded products planned increases in their advertising appropriations, wavered in their convictions early in 1919, then went "all out." The purchasing power of the farmers, the middle classes, and the former low income groups was higher than it had ever been. Goods sold so readily that few manufacturers worried about their sales departments—to regret it later. Much of the advertising was not well conceived nor carefully planned. Buying went wild. New advertised products multiplied. New pressure was put on re-establishing old ones. Prohibition brought a deluge of new soft drinks, candy bars, and stepped-up chewing gum consumption. The romance of foreign trade was revived and considerable numbers of youngsters drank deeply from university courses in it, only to find few foreign trade opportunities after they graduated. We could take little pride either in our accomplishments or our methods.

High prices became higher. Some goods were still scarce in 1920. Dealers scrambled for new lines. The grocer, the cigar store, and the drug store began to remind one of general stores. Quality deteriorated in many products. The cost of living hit new highs. Then came the big headache.

Labor strikes and buyers, strikes blossomed. Consumers were angry and worried. The last half of 1920 brought widespread price cuts. Orders in huge amounts were canceled. The channels of distribution were clogged with merchandise. Unemployment increased rapidly. Credit went "haywire." We were in for tough times.

In 1921, we heard much talk and read many articles on efficient marketing. People were hunting values. Advertising stressed "reason why" appeals. The premium and sampling which had disappeared during the war were back in new forms, including sampling through the five and ten cent store sale of small packages of the product. Private brands, which had fared badly during the war, were back again, and some manufacturers made nothing else. Substitution was still a problem. Retailers found that customers remembered wartime impertinences and grudges, real or fancied, larger than they supposed. The retailer "took it out" on the manufacturer with new demands for a wide range of special concessions. Some manufacturers answered with attempts to sell direct to consumers. Others more sensibly began working earnestly with the retailer to help him solve his problems to their mutual

advantage. We began to hear about getting back to normalcy. By the beginning of 1922, it looked as though we were, except that normalcy was hard to define in a world which had changed so much since 1914.

Belief in permanent prosperity became widespread. A real wave of simplification and standardization of products and lines caught hold. Competition between brands increased. New retail outlets were sought and new territories entered. "Going National" became a goal ardently pursued—sometimes at a loss. The competition for new outlets and new territories brought price cutting, free deals, concealed discounts, reciprocal buying, unreasonable credits and unprofitable customers. By 1928, we began to hear much of "profitless prosperity." However, the more able manufacturers were beginning to appreciate the need for and the values of consumer market research as a basis for plans and policies. They had also learned that in addition to being a mere container, a package is a show window, advertising medium and sales aid. Further improvement in designs took place, and packaging itself became a competitive weapon. The increasing use of store displays, self-service methods and color advertising called for more attractive packages and new labels.

The year 1929 is a story unto itself which goes beyond the scope of this article. However, what happened between 1915 and 1928 to packaged and branded goods and their markets tells us much of what to do and what not to do when restrictions are relaxed, the war is over and reconstruction begins.

Problems to be faced

The problems to be faced in re-establishing markets after the present war are much greater in degree than those after the last war. Last time, industry expanded rather than converted. During this war, industry has both expanded and converted on a vast scale. Because of the creation of so many new facilities, a flood of new products will undoubtedly spring up as soon as war contracts are cancelled and restrictions are eased. Shipping space, both domestic and export, will probably be short for a longer period than was true last time. Our labor force is much greater, and the problems of civilian re-employment are, therefore, greater.

Firms whose production is partially or entirely devoted to war should direct their advertising and sales effort toward market insurance. This is a recognized operating cost even for tax purposes. Yesterday's buyers plus today's buyers plus new customers add up to quite a different market from that with which most manufacturers were acquainted before the war. We often forget that approximately a million and a half of our old customers are mowed down by the Grim Reaper each year, while approximately three million new customers are born who have never heard of our product. A moment's calculation gives an astonishing picture of what happens to your market even in three or four years. These changes mean that we must do less selling and more marketing. Even when he cannot deliver a product, a manufacturer must sell his company and his product research, its ability to satisfy customers' wants when the war ends. The "know how" that is satisfying the exacting mass demands of the armed services is adding to the manufacturers' ability to turn out a better product for the money; to sell the idea of better living standards.

We often hear of market research, but we too seldom hear of *marketing* research. Marketing research involves not only markets, but channels and methods of distribution, selling, advertising and merchandising. The first function of marketing research should be to guide the over-all planning and policy determinations of the company, not merely to solve day-to-day problems. Research today for tomorrow's marketing must discover and evaluate long and short trends, basic changes, major shifts, effects of new products, new potential domestic and foreign markets, better methods of distribution and the effectiveness of advertising methods.

Advertising must be thought of as a long-term investment and not a force to be profitably applied suddenly or intermittently. Continuity and consistency, even though with small space, are a better investment for the manufacturer of branded goods than occasional, unrelated splurges and big space.

This and the last war should have proven without question that advertising has many functions in addition to selling. When he can supply little or no goods to his market, the manufacturer should use his advertising to establish the character of his management in the public mind as reputation; to protect the company from revolutionary competitive tactics now or later; to retain user interest, repeatedly justifying his previous purchases; to establish good will values which cannot be destroyed or dissipated even though a factory may burn or the machinery be requisitioned; to assure acceptance of new or improved products after reconversion; to overcome consumer prejudices, gossip and substitution of products; to hold and help distributors under trying conditions; to acquaint the consumer with the advantages of your product when it does become available.

The importance of the brand name

Wartime shortages of popular brands have created a postwar problem for many manufacturers that only intensive promotion can solve. A wide range of popular brands have shown declines in use due to wartime scarcities, and these scarcities have forced substitutions and sampling of competitive brands that would have otherwise been purchased in much smaller volume. What is happening in the cigarette market at the present time is an excellent example. Substitution of other brands of cigarettes when their favorite brand was short in supply has given the smaller producers and the less well known brands an opportunity to press for wider acquaintance, and several of them have done quite well under such circumstances. As a result, we may find soon after the war that instead of four leading brands, there may be five or six of them.

Wrigley's have had to go out of the civilian market with their regular brands of chewing gum and are now advertising, "All we can make now going to our fighting forces overseas *only*." But the company continues to play

up the brand and the package in the hope that it may hold consumer preference for the time when the domestic market can be supplied again.

There are many new manufacturing companies with ample plants, labor, capital and management, but having no known brands. They must make their choice, if they are to continue, between establishing a new brand or buying one which is already established and on which they can launch new related products in a line.

A shirt manufacturer whose brand was not so well known among civilians has become a dominant brand with military officers' shirts. This company is now using increased advertising to attract attention of officers to the trademark on their shirts; to continue to build new business among officers while the war continues; and to carry over the officers' preference to the company's civilian shirts after the war.

The brand and package should be thought of not only as a means of re-establishing a given product in a market but as a vehicle for the introduction of new items under the same brand. The extension of the Arrow brand from collars to other men's clothing items is a good example. In other words, a blanket or family brand can be an effective vehicle for introducing new products as well as re-establishing the old ones.

When products are of such a nature as to permit it, manufacturers should get good distribution through military post exchanges, canteens, and other such outlets. The returning military personnel will be a very great factor in re-establishing old brands and packages on a nation-wide scale.

When the product has any distinctive features or superiorities apparent to the sight or touch, samples or models can offer great assistance to the salesmen and can be an inducement to the consumer.

Most department stores and syndicates, prior to the war, were not ardent promoters of branded goods. They preferred to purchase or feature their private brands. Recent conversations with various buyers seem to indicate that these outlets expect the national brands to be considerably strengthened in these outlets as a result of the war. National brands have stood the test of war conditions better than commonly expected and much better than the private brands, but the fight of the private and national brands will, undoubtedly, be revived after the war.

The foreign market

Although, essentially, the problem of creating and maintaining brand recognition and preference in foreign markets is the same as in the domestic market, there are differences of condition which deserve mention. One of these is assuring protection of trademarks or brand names in these markets. In some countries, the first person to register the trademark becomes the owner. At one time, this was a widespread racket, particularly in certain South American countries. Early steps should be taken to protect fully the ownership of brands and of trademarks in all foreign markets.

Well over a year ago, Mr. Nelson Rockefeller, Coordinator of Inter-American Affairs, warned American manufacturers of the wisdom of keeping their trademarks known in Latin America in spite of the war and in spite of the fact that some of the manufacturers had little or no goods to export.

Reduced standards of living in certain countries may make it difficult to re-establish some formerly well known brands abroad. In other cases, the dropping out of an agent or distributor in a foreign market will mean that the brand has ceased to be available for a period long enough for the public to forget, and, unfortunately, the public forgets rapidly.

When one of the large rubber companies found itself without rubber goods to export, it became a wholesaler for other goods that were available. Thus it kept its distribution organization together, gained additional good will, and kept its name in the public mind with institutional advertising, stressing conservation.

Lend-Lease and UNRRA are jointly putting on the biggest sampling campaign for American goods that the world has ever known. Millions of people who never before knew American products or American brands have become acquainted with them through these two agencies and will continue to become acquainted with such goods for some time to come. Manufacturers should take every possible ethical advantage of this sampling as soon as markets are open to private business. These distributions of American goods should not only be of assistance in re-establishing old brands, but in opening markets for new brands as well.

Some branded and packaged merchandise has been entirely shut off from foreign markets and the amount for domestic distribution reduced to the point where consumers finally give up asking for the product. Such circumstances will require real effort to re-establish the brands, and it is advisable that even while there are shortages in the domestic market, a fair proportion of output be allocated to foreign markets, lest other nations preempt such markets before American exporters make their goods available.

Through cooperative efforts of manufacturers and exporters, we should establish standards for goods to be exported. These standards should be agreed upon and made widely known among foreign buyers. This would be a basis upon which exporters could stand together to improve public understanding and acceptance of their products, promote fair competition, broaden markets and minimize the needs for testing by the purchaser. The objectives as applied to such standards for exports are essentially the same as in the establishment of commercial standards for use in the domestic market. Once these standards are arrived at and become widely known, they should do much to allay suspicion and doubt in the foreign buyers' minds as to the complete meaning of "Made in America."

More marketing and less selling; more marketing research and less hunches; more imagination and less shrewdness; more consistency and less splurging can do much to re-establish the markets for packaged and branded goods. Otherwise, tomorrow's markets may belong to somebody else.

Back to tested merchandising

by Willard F. Deveneau

Now that the United Nations are well along on their hard march to Victory, there is sound reason to believe that the day of reconversion to peacetime packaging activities may soon be realized. To this end, two major spheres of postwar planning are now taking definite shape:

1. The same men who have been responsible for this country's tremendous war-developed production are now making searching studies of cost control principles, formulating plans for reducing overhead costs, investigating work simplification projects, and re-engineering and redesigning their products and packages, all to the end that present production facilities may be kept fully utilized.
2. Alert to their responsibilities in the postwar years, sales, advertising and merchandising executives are studying and planning to produce a calibre of marketing efficiency beyond anything ever before seen in this country—an absolute necessity for development of markets to consume the products of industry in the large volume and variety needed to ensure substantially full employment.

If there is one dominant and all-inclusive subject, around and towards which all postwar planning is pointing, it might be summed up in the single word—Improvement. Consumer needs and desires which played so important a role in normal times, have been given scant consideration since Pearl Harbor. In preparation for the return to peace years, there is a distinct civilian need for: improved materials; improved production processes; improved products, in design, appearance, performance and consumer satisfaction; and last, but by no means least, improved marketing operations.

The sound foundation on which modern packaging has been developed and built is the best possible reason why it will rank high in the considerations of both production and sales-minded postwar planners. A good packaging program can be an effective means both of facilitating large and economical production and of securing substantial and profitable distribution.

Prior to making any definite decisions on the specific forms or types of packages to be used, postwar planners should review and appraise the accumulated knowledge and experience represented in:

1. The sound methods of package analysis, engineering, development, design and promotion used in the prewar years
2. The experiments and accomplishments, carried on (both prior to and since the Jap attack on Pearl Harbor) in the field of conversion package development
3. The research and progress in new conceptions of protective packaging, made necessary by the shipment of war goods under conditions and to destinations foreign to anything which was ever experienced in normal years
4. Significant changes in market conditions resulting from the war experiences which will carry over into the postwar years

Methods and objectives

It is difficult for many seasoned executives to disregard and forsake known packaging rules and practices, in favor of some of war-induced methods. Divergent viewpoints on packaging methods confirm the advisability of examining both the old as well as the new packaging standards and practices, and then, by carefully estimating the changes which will likely be found in postwar markets, arriving at decisions embracing the best ideas in both schools of thought.

A representative summary of the practical objectives which were sought by manufacturers of consumer goods in developing their prewar packaging programs is briefly reviewed for the convenience of all executives planning postwar packages:

1. *Protection*—The primary purpose of a package is to ensure the safe delivery of the product to the ultimate consumer.
2. *Visibility*—Today there is more necessity than ever before for packages to be plainly visible. Visibility does not necessarily mean grotesque color schemes or design treatment. Sound research on product and consumer will soon determine the one best color scheme that is entirely appropriate to make any given package readily visible and attractive to the largest possible proportion of its market. While in some cases it is a distinct advantage to make the product visible in its package, this is by no means universally true. This point deserves careful study to weigh its advantages and disadvantages before making a final decision, and accepting a given package design.
3. *Accessibility*—Since consumers like to see, feel and handle the products in which they are interested (before purchasing them), the manufacturer will benefit by making provision for such examination, without danger of marring the good appearance and orderliness of the original package. Even after it is purchased, accessibility of the product in its package is important to the consumer.
4. *Informativeness*—Women are showing more and more clearly that they wish the products they buy to be in packages that carry honest, understandable information. True informativeness calls for simple facts about the product, what it is made of, what it will do, all the ways of using it, and the maker's

guarantee—all to help the consumer buy knowingly, willingly and intelligently.

5. *Forcefulness*—This term refers to the quality a package possesses not alone to make itself seen, but to sell itself on sight. Ordinarily this can be achieved most effectively by attractively portaying in word and picture the benefits the consumer will enjoy through possession and use of the product, or, conversely, what each day's delay in buying and using the product will cost in loss of ready satisfaction. Particularly with products sold in self-service stores, the package must do its full share in the job of pleasantly inducing the consumer to buy on sight.
6. *Practicability*—Most of the products, sold every day of the year by practical business men, need packages that are practical for setting up, for storage, for shipping, for display, and for use by the ultimate consumer. Spending a little time and effort to make sure that a proposed package meets the very practical requirements prevailing in the manufacturer's own plant, in the jobber's establishment, the retail store, and the home of the consumer, will pay.
7. *Display*—The entire strategy of modern merchandising centers around bringing products to the favorable attention of prospects who can profitably use them and who have the money to buy them. No better means are available than to present a product through its package, and nowhere can the buying impulse be more profitably aroused than in the retail store where the action of buying can immediately follow stimulation of the desire to own and use a product. The package must do something more positive than simply make itself seen—it must act as a silent salesman.
8. *Advertising*—Many manufacturers are missing golden sales opportunities by not taking full advantage of the values available in their packages as powerful advertising media in their own right. Packages are seen every day by thousands and thousands of consumers who are perfectly willing to exchange their dollars for products which meet their needs and satisfy their desires. Since making the consumer conscious of his package is an important part of a manufacturer's complete selling job, certainly the package should be so designed that it can be given prominent display in all forms of advertising used, be it in magazines, newspapers, trade papers or direct mail.
9. *Packing*—No package can be considered entirely successful unless in designing it due consideration has been given to modern factory operations. Even though in its introductory stages a package must be assembled entirely by hand, provision should be made for the later period when volume will require the economies possible only with high-speed, fully automatic packaging machines. Any experienced supply dealer will gladly furnish definite help of this kind and, in addition, the engineering services of the large makers of packaging machinery are available to assist manufacturers in designing packages that will be altogether practical, and in making the transition from hand to machine packing with a minimum of trouble and expense.
10. *Economy*—In seeking economy in packaging, the experienced manufacturer knows that there are many factors of greater importance than merely the lowest possible price at which his package may be purchased. True economy in packaging comprises, in addition to a wise utilization of available materials, a careful study of all the processes and costs involved in putting the product into the package in the manufacturer's own plant, safe transportation for it, effective display and all other factors appropriate to the individual product, such as its price, its degree of acceptance by its market, its competition and the merchandising job required to sell it profitably.

Conversion packages

In studying the utilization of non-critical, or less critical, materials in the development of conversion packages the postwar planner should carefully investigate and measure the results accomplished by conversion packages in specific relation to the practical packaging of his own particular product or products. As a ready reference the eight major conversions in packaging materials used during the critical war years are given herewith:

1. From solid metal packages to all-paper packages
2. From solid metal packages to paper packages with metal ends
3. From solid metal packages to glass containers with metal closures
4. From solid metal packages to glass containers with non-metallic closures, that is, paper, plastic or wood
5. From metal-end packages to all-paper packages
6. From foil-wrapped packages to all-paper packages
7. From nailed, wooden packages to all-paper packages
8. From plastic packages, whether transparent or opaque, flexible, semi-rigid or rigid, to all-paper.

Progress in protection

This field embraces the study of packages, which provide altogether new standards of protection, and merges with the study of conversion packaging. The basic problem has been one of providing sufficient protection so that a wide variety of war products could be safely shipped to the far corners of the earth, where they might be subjected to all kinds of atmospheric conditions, plus hitherto unknown difficulties in unloading, handling and storing.

Military experts have joined technically trained specialists from industry in painstaking analyses of the physical and chemical nature of all kinds of war goods, how these products might be adversely affected and the causes for the unfavorable changes in them, and then have developed packaging specifications covering structural style and materials, designed to provide the positive protection required.

As a matter of record, it was found that a product might be adversely affected in ten possible ways:

1. Change in physical state, from its natural size, shape or structure (such as dry, moist or fluid), to some less desirable form
2. Change from soft and pliable to hard and brittle
3. Change from thin to thick
4. Change in appearance
5. Change in color
6. Change in taste
7. Change in odor
8. Change in acidity or alkalinity
9. Change in edibility
10. Change in chemical structure, bacteria count, etc.

The major causes for these unfavorable changes were found to be: dry, moist or hot air; gas; water; moisture-vapor; extreme heat or cold; exposure to or penetration by light; faulty or poorly adapted packaging materials.

The subject of protective packaging has come to the attention of such a large percentage of package users in this country that it would be strange if it didn't exert an influence in postwar packaging. Obviously, the extent to which any one manufacturer may find it profitable to adopt highly protective packages will depend upon and result from a searching study of the particular conditions surrounding the normal production, distribution and consumption of his product. At the very least, he will now have access to a vast source of additional valuable and never before available information which should enable him to safeguard the delivery of his product into the hands of the ultimate consumer in more perfect shape than ever before.

Significant marketing changes

An analysis of changes in the market resulting from experiences brought about by the war, is of the greatest importance to those executives whose interest in postwar planning concerns itself primarily with building sound and profitable sales and advertising programs.

Changes in location—Drastic changes in location have been sustained by:

1. The men and women in the services, who have been called upon to leave their homes either for foreign duty or for some post within this country.
2. Those engaged in active war production, who have found it necessary to move to the concentrated production areas.

The important question about such shifts in population is: will the market swing back to its prewar regional patterns, or will the war boom areas be able to hold a goodly percentage of their gains?

Changes in income—It is reasonable to assume that the majority of those serving in the armed forces have enjoyed more "free money" than they were accustomed to. Also, war years have greatly increased the average family income. One analyst declares that whereas in 1935 and 1936 the average gross income per family was $1502, it increased to $4071 in 1943. Part of the increase is doubtless the result of war inflation as well as increased productive activity. Whether the income gain can be carried over into the postwar years and the extent to which it may be made permanent will depend in large part on how successfully American industrial leaders are able to attain their objective, which Alfred C. Fuller has stated as: "To produce more goods for more people at lower costs while constantly increasing payrolls and purchasing power."

Changes in buying habits—It would be totally illogical to believe that the experiences gained by our armed forces would not have a marked effect on their tastes, demands and habits when they return to civilian life. The experiences of our civilian population during these war years have also brought about changes. Paradoxically, while the masses have been receiving unprecedented cash incomes they have been rigidly curtailed in freely spending them by rationing and the unavoidable shortage of civilian goods. As might be expected there has been a noticeable increase in the buying of such luxury and semi-luxury goods as were available, with foods, cosmetics and medical preparations holding a prominent and preferred position. Now invested in victory bonds and in savings accounts, a tremendous latent spending power will be available. There are, however, four limiting factors which are worthy of consideration in regard to the $100,000,000,000 which American consumers have on hand, and their pent-up desires to buy peacetime civilian products:

1. Possible voluntary consumer adoption of substitute products
2. Effect of keener appraisal of value and quality to wihch consumers have been educated
3. Unfavorable consumer reaction to inefficient and indifferent merchandising and sales service
4. Possible restraint in purchasing caused by popular anticipation of depression period.

It may not be easy to alter the practices into which consumers have been forced during the war.

Changes in retail stores—According to data released by the Distribution Division, U. S. Department of Commerce, there has been a net decrease of about 16 per cent in the number of retail stores in fourteen important volume lines during the period of 1941—1943. Chief casualties have been among radio, electrical supply, filling stations, automobile dealers and repair shops, while the smallest decreases have been experienced among dealers in drugs, wearing apparel and hardware. The causes are to be found in rationing, shortage of goods, loss of personnel, and the transfer of former proprietors either to the armed services or war industries.

In considering the many influences which will have a marked effect on the postwar distribution of consumer goods, we have selected a very few of the important subjects, which will be referred to briefly—each of which is worthy of much careful study:

1. There is considerable question as to the number of former storekeepers and employees who will be content to return to their occupations.
2. While it would seem likely that convenience goods, such as groceries, drugs, notions, housewares, etc., would continue to be sold through small "neighborhood stores," there is a growing tendency in favor

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of few but more complete stores on the part of the large operators.

3. There seems to be a great deal of thought being given to the modernization of stores which are operated by independent retailers. This of course would be a cost-lowering factor.
4. Everything points to the decentralization of retail shopping areas, due to the desire to live in suburban sections and to shop in areas free of downtown traffic congestion.
5. There is every reason to believe that manufacturers will take a greater interest and more active part in retailing, either by actually entering the field as operators of their own retail stores, or by giving more extensive assistance to building up their independent retail dealers.
6. Certain retailers will have opportunity to expand their lines and sales (such as filling stations which may handle a wide variety of products other than gas, oil, tires and automobile service).
7. Air transportation of goods should result in faster and more frequent deliveries, and economies which may be passed on to retailers and consumers by eliminating the cost of operating nearby warehouses, all to the end that dealers may benefit from lower inventories, faster stock turnover and making perishable products available out-of-season, as a sound means of attracting wider patronage.
8. The sound growth and expansion of the self-service idea, now extensively used in food, hardware, drug, variety and department stores, will most certainly be adopted by other classes of retail stores in the postwar period, for the following reasons:

   a) Consumer desire to handle and examine goods freely
   b) Consumer preference for selecting goods independently of sales clerk
   c) Consumer recognition of self-service operation economy
   d) Consumer appreciation of opportunity afforded for comparative shopping.

This represents at once a tremendous opportunity and responsibility for manufacturers of consumer products, for as self-service stores grow in number and variety, the fewer and fewer will be the products which are not individually packaged to show off the product to advantage. Furthermore, this type of distribution makes it mandatory that the package have sufficient space on it in which to detail the information the consumer wants to know. The profitable package will enable the consumer to make an intelligent on-the-spot decision by informing her of all of the following factors:

1. What the product is and its many uses
2. Who makes it
3. How much is in the package
4. Of what it is made
5. How to use it
6. Its quality and advantages.

Changes in available products

Under the war emergency, a large amount of study has gone into the development of new or materially improved products which will make their appearance very shortly after hostilities cease. To mention a single field, we might cite foods. The war has greatly accelerated the development of: (1) quick-freezing processes for many foods—and their appropriate packaging (2) dehydration processes for certain foods, with emphasis on the retention of the taste and texture present prior to dehydration (3) many new types of food products; pre-packaging various products in "family service units."

We must not underestimate the influence which thousands of returning service men will exert, with their acquired liking for various foods, nor the possibility when international airways are in active operation, of obtaining many delicacies of foreign origin.

Conclusion

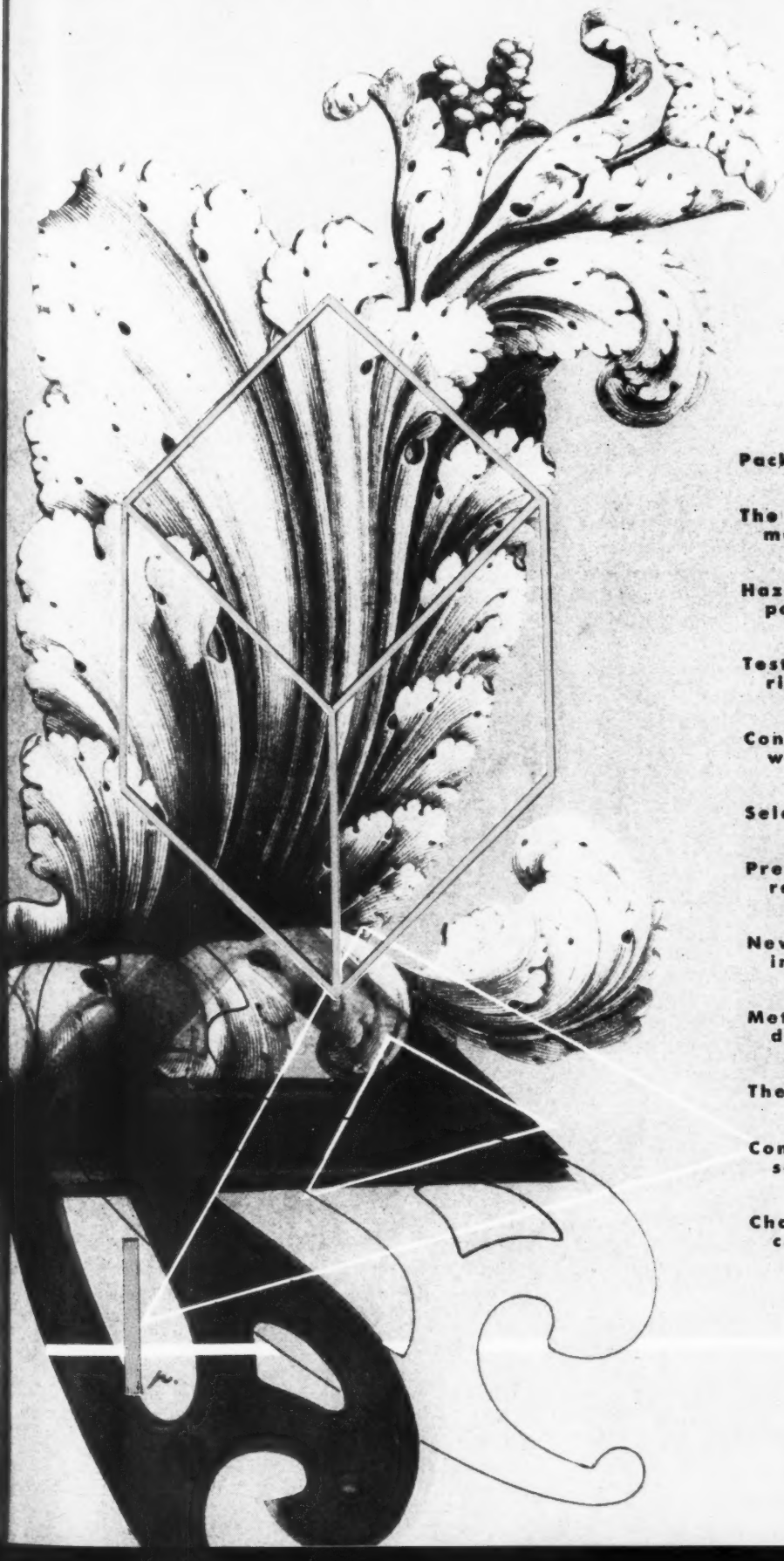
In all probability there will be many products and materials introduced in the period just ahead for which the promotors will make fabulous claims as "wartime inventions," and it will pay the consumer to investigate these carefully before buying.

Applied to packaging, this is well illustrated by the experience of a man who reported being offered a moistureproof material about which the salesman made most extravagant claims. When asked to produce concrete evidence, showing just exactly how moistureproof his product was, the salesman replied, "Well, I can't say exactly, but Brother, it's terrific!" Subsequent impartial tests revealed the only terrific thing about the material was its utter inadequateness for the exact purpose for which the salesman had so enthusiastically recommended it.

It has been pointed out that reduction in glass container weight without sacrifice of strength, and the redesign of bottle shapes to withstand greater impact, are two real advances due to recent research—yet neither one bears any close relationship to the highly dramatic comments reported in current Sunday supplements.

A safe method of benefitting by the war-induced developments in packaging would be to insist upon indisputable proof to substantiate "fabulous new discoveries" —and also to investigate their latent possibilities.

Packaging advances, moreover, may not be the result of entirely new products, but rather the will and "know how" to use prewar materials in new ways or new combinations to product much greater strength, protection or some other quality. Packaging as a whole will derive the greatest benefit from war-induced developments if these are thoroughly investigated and appraised in the light of peacetime requirements and tested markets. For the basic functions of a good package still remain the same, namely, to afford protection, facilitate handling and storage, and assist in creating sales for the product. Therefore, make your packages as attractive as possible and enable them to give adequate protection, but above everything else, design them so they will appeal to the needs and desires of your market, thereby enabling them to serve as effective "silent salesmen" for your product.



PACKAGE PLANNING

Package functions 52

The packaging department 54

Hazards encountered by packages 58

Testing package materials and packages 59

Consider production when designing 64

Selecting package colors 67

Preparing art for reproduction 69

New developments in inks 73

Methods of reproducing designs 75

The artistic element 84

Contract packaging service 87

Chart: Standards for color identity opposite 68

Package functions

Today, package consciousness is perhaps greater than ever before. The very duress which war conditions have imposed upon the packaging field has been largely responsible for this state of mind. Due to necessary restrictions on materials, manufacturing, and distribution, the consumer has been denied many customary package conveniences and his attention has become focused upon qualities normally taken for granted. The same conditions which have inconvenienced the purchaser have forced the producer into new fields of research. Substitute materials had to be found, new methods of production devised, distribution rearranged. Above all, rigid wartime specifications had to be met. The old fashioned method of arbitrarily "selecting" a package has been completely scrapped. The analytical method of package development, which was struggling into existence even before the war, has come into its own at last. Exacting government demands have served to augment available data regarding packaging, and to promote a scientific approach in the solution of package problems. Guesswork is no longer necessary. The public is aware of this.

As knowledge has been gained, the scope and importance of package functions have been magnified. Their complexity has increased to satisfy increasingly complicated needs. Throughout the changes and developments which have characterized recent years, however, the fundamental functions of good packaging have remained the same. Briefly they are: protection, convenience, economy, and appearance. In the past, too little thought has been given to the proper balance of package functions—too little, even, to the functions themselves.

Before package development is undertaken, a complete analysis of the problem in its entirety should be made. This may call for the services of specialists in a dozen different fields. After breaking down the problem into its various requirements, it should be possible to formulate definite specifications. Compromises may be effected through a scientific evaluation of each of the functions outlined herein.

It is axiomatic that packages must serve to contain and protect the product so that the ultimate user will find it in the condition in which he was intended to find it. This is a large order. It indicates a package which will keep all harmful influences away from the product, and one which will at the same time prevent the qualities of the product from escaping or from reacting undesirably.

Some of the hazards to which a package may be subjected are: long periods of storage, rough handling, a wide range of temperature, sudden temperature changes, moisture, light, bacterial action, insect or rodent infestation, moulds, dust and corrosion. Pertinent data, therefore, should be obtained regarding the properties of materials under consideration for packaging purposes. It is unlikely that any specific package will be called upon to meet all the contingencies cited, but all packages will be required to survive some of them. For various reasons it may be necessary to discover any or all of the following material properties:

- tensile strength
- percentage of elongation
- bursting strength
- tearing strength
- folding endurance
- water absorption
- moisture vapor permeability
- permeability by gases
- resistance to acids and alkalies
- resistance to greases and oils
- resistance to organic solvents
- reaction to temperatures
- reaction to sunlight
- flammability

In the light of recent progress, the need is recognized for high test standards in determining material characteristics. On the basis of accurate analysis it is possible that selection of material may be governed by the most urgent requirements, and still fall within a reasonable margin of safety in meeting other specifications.

A complete story of what things affect a product and how fast, may be derived from the following data:

1. Humidity equilibrium
2. Quantity of deteriorating element (as percentage by weight) to make product unusable or unsalable (index of failure)
3. Amount of free water
4. Per cent of oil and grease (kind and melting point)
5. Chemical activity (acidity, alkalinity, etc.)
6. Per cent by weight and kind of volatile ingredients

The chemical effect of the above data on the interior of the container must also be studied.

The mechanical strength, durability, and tightness required of package and material from the aspect of its contents may be determined by ascertaining the bulk density of the product, its abrasiveness, and mesh analysis.

Fitting the package to the product is becoming increasingly important for proper preservation of the ready-for-use, small size units which require a high degree of protection. Sometimes these packages must serve to protect a product which is used only a bit at a time. Sometimes the package must fulfill a re-use requirement. Always in foods and drugs it must be nontoxic.

A less technical aspect of developing a package is the matter of making it conform to the demands of practical convenience throughout its existence. Before the product is packed, it must be possible to handle and store the packaging material conveniently. Due consideration must be given to the requirements of mass production. Speed is here to stay, and must be accepted among the requisites of successful peacetime industry. Awkward types of packages that tend to slow up manufacture have no place in tomorrow's plants. In so far as possible, shipment and

storage should be facilitated by package design. Also, wholesaler and retailer have a right to expect goods which may be easily handled and efficiently stacked.

Then there is the consumer's point of view to be studied. If the package is to be handled and carried by a woman, it should be designed for ready grasping, and should be no heavier than is necessary. Packages which are destined for refrigerators, kitchen shelves, and bathroom cabinets should be built to fit. Containers for household commodities require closures tight enough to be leakproof, but these should yield to feminine hands for removal. Even frankly decorative packages must conform to convenience.

Other practical factors which may appeal to the user are such things as pouring spouts, dispensers, and recipes. Transparent "windows" may serve a two-fold purpose, showing at a glance what the product is made of and how much of it there is. All sorts of devices have been and will be employed to enhance the value of the very important convenience function of the package.

If packaging had not satisfied a demand for ultimate economy, it never would have developed to its present extent. Unless in some way a package pays for itself, it dies a natural death. This does not mean that the initial cost of a package must be low in order to be economical. On the contrary, a cheap package which fails in its function of protection, may be the cause of disastrous waste—may even doom the product. In other cases, if protection requirements are low, there is no advantage in expensive "overpackaging."

In working toward true economy, evaluation of other package functions must be carefuly established. If the package is to be depended upon for salesmanship, it is necessary to have a thorough understanding of the consumer market. In some luxury lines, apparent extravagance in the package may bring high returns. The consumer who indulges in luxuries is usually willing to pay for a fancy container. Psychologically, at least, the aesthetic touch enhances the value of the product.

In the food field, however, and with a number of household commodities, the situation is apt to be quite the reverse. Very slight differences in cost tend to attract or repel the purchaser. Even a fraction of a cent may cause him to seek a substitute—or a competitor's product. The food producer may well be wary of expensive packaging.

If the indicated spread of self-service eventuates, the producer who is attempting to curtail package costs may find himself in difficulties. Self-service will mean that even the humblest package will have to take on the duty of salesmanship. Just how the producer and designer will cope with the problem remains to be seen. It is quite conceivable that revolutionary changes may take place in the packaging of every-day foods and commodities as well as in many other lines.

Other examples of obvious economy in packaging are the cases of butter and cheese. The actual cost of small unit packing for these products is probably less than the cost entailed in bulk handling. Certainly the small unit packing is less wasteful in that it eliminates loss and spoilage. The consumer is better satisfied with uniformity in weight, and with the improvement in sanitation.

Whether or not packaged products in the food field are actually more economical because they are packaged, consumers appear ready to accept and pay for them.

The term "appearance" as applied to a packaging function is used in a broad sense. It indicates:

1. Any attributes of the package which tend to identify the product and producer
2. Any attributes of the package which give information concerning the product or how to use it
3. Any qualities or attributes of the package which invite the consumer to buy

The function of appearance is inextricably bound up with the three other package functions previously discussed. The designer must have an awareness of the contributions made by all departments concerned. He must be familiar with the product outlets, ultimate consumer requirements, and the sales and marketing problems. It is his job to take up where the technician left off, accepting the results and decisions of the technician's research.

With the above limitations, the successful designer somehow contrives to characterize the product, attract the consumer's favorable attention, and supply a memory value which facilitates re-ordering. The great strides which have been made in the development of materials and in methods of reproduction give the designer a wide variety of media through which to achieve his ends. Moreover, increasing competition, which the return to peacetime industry is expected to bring forth, will serve to stimulate his ingenuity.

On the premise that the product itself is good, a well designed package can do much to establish its market. The competent designer may approach his problem by pondering such aspects as the following:

1. The product
   a) Brief description?
   b) Various uses?
   c) Is it one of a "family" of products?
   d) Should it be packaged as one of a "family"?
   e) Exact brand name and trade mark? Registered?
   f) Margin available for package expense?
2. The market
   a) Who are the ultimate consumers? What section of the country sold?
   b) What special consumer buying habits must be considered?
   c) Through what outlets will the product be sold?
   d) What type of operation are these outlets?
3. The competitive situation
   a) How do competitive products compare in quality
   b) How do competitive products compare in price?
   c) How do the packages compare?
   d) What is the distribution status of competition?

The answers to these and other similar questions must be formulated before the designer can proceed to something tangible in the way of package appearance. Again, this shows the necessity for combining and correlating the view points of artist, engineer, and sales specialist.

The packaging department

by C. A. Southwick, Jr.

Finding the most effective package for a given product is far too complex a proposition to be treated casually. The controlling executives, of course, should have a sound knowledge of the product to be dealt with, and a broad understanding of packaging and material functions. But theirs is a supervisory function. The actual conduct of packaging is a full time activity for a fully trained and experienced specialist.

Investigation of new materials, for instance, entails a tremendous amount of research and testing. Too frequently it has been the custom to delegate these activities to individuals or departments as secondary responsibilities. Material is too important an issue to be considered a side line. It is necessary for each successful packager to know how new materials fit into his specific set of package requirements. Not only must investigations and tests be conducted, but also the results of these tests must be evaluated in the light of data obtained from all of the other departments of the organization.

Similarily, every aspect of package development is entitled to fitting investigation and tests, and correlation of findings. No decision is sound unless all factors have been considered and analyzed as to their effects on the product as a whole.

The study of the various phases of packaging requires the services of men with widely different skills. It is, therefore, wise for the packager to obtain the best available help in each department, and to appoint a representative body which is competent to correlate data.

The responsibility and the size of departments are bound to vary in different organizations with the varying factors of the industry. In a small organization one person may represent more than one phase of activity and in a large organization each phase may require a group of individuals. The important thing is to have all factors governing good packaging properly covered and correlated. The various departments of an average industry and a successful system for their operation are described in the following paragraphs.

It has been shown that the pattern by which an organization operates is elastic. Nevertheless, in one form or another, each component must perform its specialized function which is then correlated with the work of all of the other groups.

Packaging committee

A body which would be competent to correlate the research findings and test results in all departments might be called the "Packaging Committee." Such a committee should consist of representation from each department of the organization.

Its responsibility should be to make recommedations after consideration of all the data available from all of the departments.

Purchasing department

This group has knowledge of material and package costs, availability of materials and sources of samples and production needs. The purchasing department must be given specifications by the production, the technical and art departments for the materials, packages and equipment to be obtained. The purchasing department should never be allowed to buy on price alone. Competitive products can be tested and approved before purchasing.

Art department

The art department may be a part of the company, or its work may be performed by an outside designer. In either case, its scope should cover the printing and other decorative phases of packaging. It will cooperate closely with the advertising and technical departments to satisfy the needs of each.

In many cases protective qualities can be combined with decorative, and these must be tested and approved by the technical group. The art department must not decide upon the package materials but must use those found suitable by the technical department. The art department should then write specifications for inks, type of printing, etc., and the grade and surface required for the purchasing department. It must also set standards of color and of quality which will be used for the guidance of the production department.

Sales department

This department supplies most of the problems as a result of its needs for new products, new packages for old products, changes in merchandising and competitive activity. It should furnish the facts on the ways and channels of merchandising, the rate of turnover, the areas of distribution, etc. The committee work is primarily to satisfy the demands and needs of this department.

Production department

This group must package products effectively and efficiently in the equipment, form and in the materials decided upon by the committee. For its own protection, it must cooperate with the technical department to set up standards of operating characteristic and control tests. Production specifications on both materials and finished packages are important for low-cost operation, reduction of loss of materials and for the development of uniform protective packages.

This department knows the limitations and productive capacity of its existing packaging equipment—a very important factor.

The technical department and production department must cooperate closely on product changes and control, on package and material specifications, and on the control of finished and filled packages.

Advertising department

This group supplies all of the facts concerning the style and the decorative phases of the package. It also gives the data about the relationship of the package in question to the other products which are included in the general advertising program.

Consumers-service department

Whatever the name, this group should represent the consumers' requirements and viewpoint. Problems of size, opening devices or other conveniences, how the product is used and many more questions can be presented by this department. Such data and opinions may be formed by surveys and by a consumers' kitchen. Such representation on the package committee is important and necessary, but is very often forgotten.

Technical department

The most important single source of the full data concerning package and material functions is that scientifically trained group, the technical department. All divisions of this department must cooperate closely with each other. and with the production and purchasing departments on specifications and on control of the packaging materials.

The group is indispensable for indicating the materials and package forms which can be used for any given package problem. Its equipment, methods, and personnel require careful consideration.

To operate effectively, the technical department must have laboratory facilities, and personnel assigned entirely to packaging problems. The elaborateness of the equipment and the size of the staff will depend upon the nature of the company and the amount of work to be done. It must be recognized, however, that successful package testing requires special knowledge and special facilities. Proper interpretation and presentation of laboratory findings are as important as the tests themselves. This point is emphasized because in too many cases, packaging problems are assigned at random to incapable personnel or to inadequate laboratories with the result that necessary data and their correct interpretation are not obtained. It is to be hoped that the growing recognition of scientific package development will lead to official testing standards, and that it will also lead to proper provision for meeting the standards once they are established.

The packaging laboratory

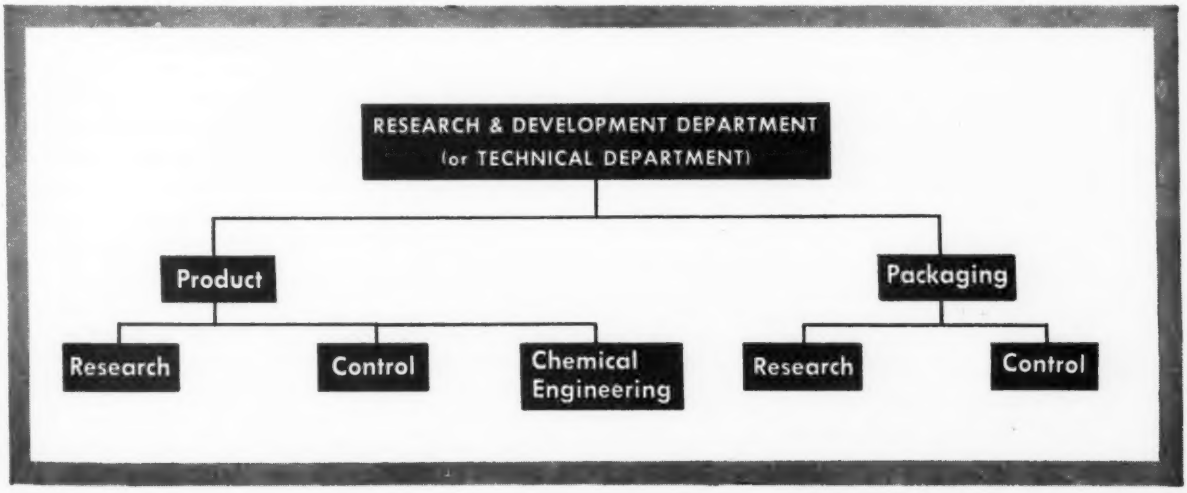
Many firms have found that a laboratory, devoted exclusive to packaging projects, is a profitable investment, and a worthy adjunct for the packaging committee. Such a laboratory, well equipped and staffed, can be held responsible for a continuous flow of material and package test data to the packaging committee.

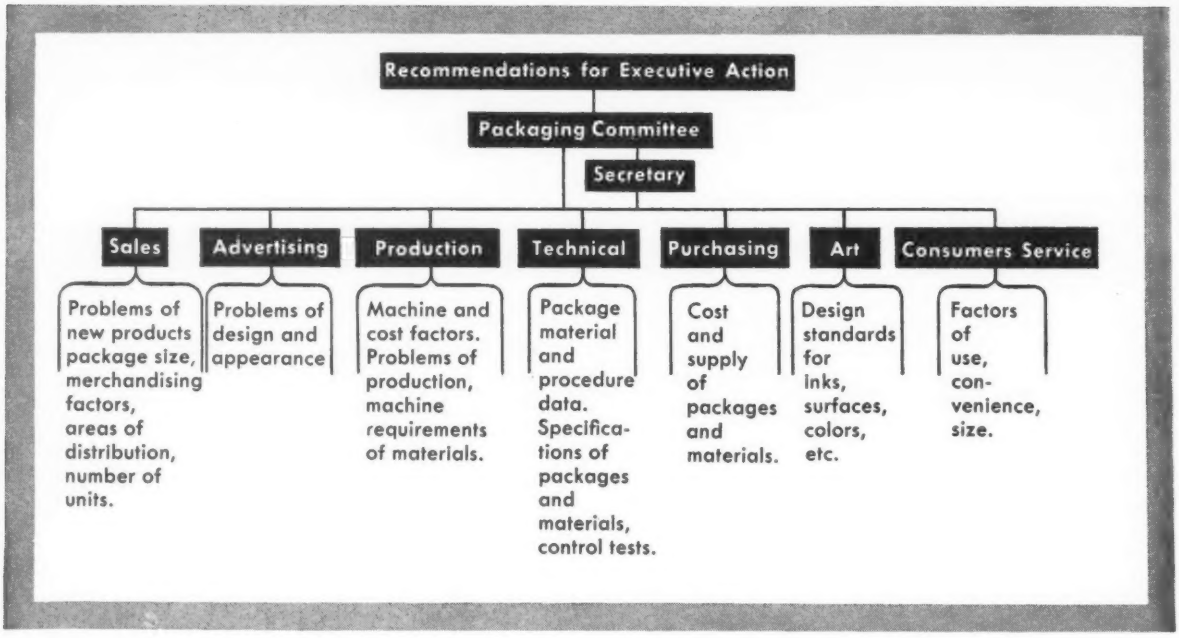
The following outline suggests the pattern and scope of such a laboratory:

I. Currently used packages and materials
   A. Control tests against specifications on
      1. Package materials purchased
      2. Packages as purchased
      3. Components for package use
      4. Finished and filled packages from production lines
      5. Unit machine operations in package manufacture or handling
   B. Comparative tests of currently used packages, materials and equipment against
      1. Competitive packages
      2. New packages and materials offered by prospective or present suppliers
      3. Newly developed components or materials capable of similar function
      4. New or improved equipment
   C. The responsibility for proper sampling and control technique

II. The development of specifications of currently used package materials and components
   A. Complete mechanical specifications for package components
      1. Of strength and durability factors
      2. Of weight, area and yield factors
      3. Composition and identification

(Continued on next page)





B. Complete chemical specifications
   1. Of permeability values
   2. Of resistance to penetration by, and reaction to, various agents
   3. Other factors of minor importance
C. Complete manufacturing specification of package materials and operations
   1. Weights of applied coatings, adhesives, etc.
   2. Machine kind and operating details

III. Specifications of currently used finished packages
A. Mechanical specifications
   1. Package form, dimensions and composition
   2. Strength and durability factors
   3. Weights and areas of all component parts and elements
B. Chemical specifications—Length of protection of contents under deteriorating conditions
   1. At normal conditions with usual product
   2. At accelerated conditions with
      a) Usual product
      b) Comparative contents such as $CaCl_2$, etc.
C. Manufacturing specifications
   1. Kind and operating details of filling, forming, closing and similar equipment and operations
   2. Data on temperature, time and pressures of heat sealers or composition and the weight of adhesives

IV. Research on new package forms and materials
A. Comparative tests against current materials
   1. Mechanical and operational factors
   2. Chemical functions
   3. The development of improved and new methods of testing and evaluation

V. Research and testing for packaging characteristics
A. Tests to evaluate mechanical properties
   1. Density
   2. Abrasiveness
   3. Other mechanical properties
B. Tests to evaluate chemical properties
   1. Degree and rate of effect of outside deteriorating elements
      a) Water vapor
      b) Water
      c) Air and other gases
      d) Age and light
      e) Other factors
   2. Degree and rate of product deterioration by
      a) Loss of volatile components
      b) Change of state
      c) Temperature
      d) Other factors

This pattern of the scope and activity of the packaging laboratory is not complete in every detail, but broadly covers the kind of work for which the laboratory must be staffed and equipped. Obviously a technically trained person must check and supervise such laboratory operations and also compile and report the laboratory data into readable and useful conclusions. Many of the standardized tests and routine control work can be performed by assistants having manual dexterity and good training but no technical education.

While this pattern looks very formidable, it must be realized that it is not necessary to conduct all tests and operations at once and that the complete story on a material or package proceeds stepwise as the basic tests are found acceptable. The failure of a package to meet quick tests eliminates it.

However, complete data and control values should be available on all materials, packages and products that are

in current use and for those which it is possible to consider as substitutes.

A complete set of data and continuous flow of control reports will:

1. Ensure the most efficient use of materials and the guarantee of product protection
2. Allow the purchasing department to obtain materials at the lowest price compatible with performance
3. Prevent suppliers from degrading quality or making substandard shipments
4. Make it possible to make changes and substitutions without danger of losses

The laboratory equipment is divided into two classes:

1. Instruments and equipment for making tests of package materials, components, physical tests, product tests
2. Cabinets or rooms of controlled atmospheres for making accelerated package and product tests

Both classes include standard equipment or instruments for some of the testing, while special or improvised equipment is necessary for some of the phases involving new techniques or unusual storage conditions. As the science of packaging develops, standardized tests and equipment for performing them will become available. Until then, a packaging laboratory should standardize all of its own procedures.

On such a basis a packaging laboratory can contribute effectively to the work of a packaging committee.

The system in operation

An overall picture of the system in operation is given as follows:

The packaging committee should be composed of one person assigned from each department. It is preferable that the same person attend all meetings unless the company is so large that some departments must send different people for different groups of products. Such a situation could exist in sales or advertising, but should not arise in the production, purchasing, consumers-service, or art departments, and must not happen in the case of the technical department. It is most satisfactory to assign a permanent member from each group, and to call before the committee other persons particularly concerned with the problem at hand, when necessary.

The committee should have a secretary whose duty is to report the facts and opinions presented and the final conclusion of the meetings. Obviously, as many packaging materials, designs, and forms as appear practical, together with cost and production data, should be reported to the executive group before a final decision is made.

The packaging committee should meet at the same time each week with special or task group meetings as required. The sequence of operation could be:

The member from the sales department presents at a committee meeting the problem of packaging a new product just developed by the research department. Next, the product is described, its chemical and physical properties are given by a member of the research department. The sales department then describes where and how it would like to market the product. The consumers-service member tells how the product is to be used in the home. The technical member of the committee is then assigned to get samples of the new product, find its special requirements, make package tests and recommend materials.

This assignment concludes the discussion of the new product at the committee meeting. At the next meeting, the production department presents facts on the cost of the product, the sales department tells the two sizes of packages it requires, and the consumers-service adds certain facts on home uses.

The technical department, meanwhile, has determined some of the product's characteristics, but does not have package data. At subsequent weekly meetings some additional data are accumulated, but no serious discussion occurs until the sixth meeting when the technical department presents the results of package tests. This report covers several package forms and a variety of material combinations. The sample packages have been exposed to deteriorating influences both physical and chemical. The conclusion shows certain product characteristics which allow the committee to decide upon a type of package and a level of protection best suited to the particular type of product.

The art department is given the task of color, design, etc. The production department then is assigned the task of surveying the cost of new equipment and other factors, while the technical department makes additional tests of a greater number of material combinations of the approved package form. These results are reported in six weeks (the twelfth meeting from the start of the problem). At this meeting the three best package combinations are turned over to the art department for samples in the colors and designs which have been tentatively approved. The purchasing department and production department are given tentative material specifications, both mechanical and chemical, to obtain costs. The production department also reports on the necessary equipment for production of the yearly quantity estimated by the sales department. Meanwhile, the technical department has started another series of tests for confirmation of the previous tests, so that more complete data will be available to the entire group.

At the fourteenth weekly meeting, the complete report giving recommendations, designs, costs and specifications is presented for final decision to the controlling executives. Actually, this is a rather simplified procedure, but it is a pattern for the proper sequence and operation of an efficient fact finding packaging committee. Additional activities should be determined by the requirements of the individual concern.

The final decision

The final decision is made from laboratory-test data, sales and advertising requirements, cost considerations, manufacturing needs, and appearance and convenience factors. All these elements are present in every package change, and each must be weighed as objectively as possible. Here is a proved way to eliminate guesswork and achieve packaging in a rational manner.

XUM

Hazards encountered by packages

By Dr. E. C. Merrill

There is perhaps no problem today involving a wider scope of perplexities than that of successfully protecting merchandise. Recent scientific developments have served to improve the quality of protection achieved, but the problems at hand have not been simplified. Packaging at best is a complex activity. Too often an apparently simple problem of packaging and protection has turned out to be more complicated than it at first appeared, just because the persons concerned did not direct attention to all factors involved.

Primary considerations of specific problems involve:

1. Nature of merchandise—(a) perishable, (b) normally stable
2. Expected shelf-life
3. Area of distribution—(a) local, (b) national. (c) foreign

Undoubtedly one of the most common problems in packaging is the protection required against moisture, so important these days not only in closures and liners for bottles, but as well in numerous metal substitutes for packaging described as moisture resistant. While certain technical information may be afforded by the suppliers of materials as to the moisture-vapor permeability of these products, it does not necessarily follow that such material, when used commercially in the package in question, may be wholly relied upon to be as efficient as the tests indicate. I have in mind the case of protective films, laminated products of cellulosic material and numerous classes of sheet materials that may or may not stand up under the fabricating and flexing operations that occur to the manufactured product. Hence the desirability of the practical test for moisture-resistance in the final finished form.

But in considering the factors that decide the suitability of package materials, we must look broadly at the complexity of influencing factors which may work individually, or in combination with one another, as different conditions may arise in the varying geographical and climatic areas to which goods are shipped.

Of these influenced may be mentioned: heat and cold; moisture or humidity; extreme dryness; light; vibration; bacterial action; moulds; insects; dust; atmospheric action, such as SO_2 in the air of some cities during winter months; chemical action; permeability of odorous materials contained in package, with impairment of content; migration of volatiles from within, with impairment of lithography and printing on package; shock in handling operations; barometric pressure.

While it is true that certain of the above-mentioned considerations may be extremes of remote possibility, these influences might, nonetheless, manifest themselves under certain circumstances.

Since the postwar period will unquestionably develop considerably more express and freight shipment by airplane, greater consideration of the wide changes in atmospheric pressure inevitable to air travel is necessary.

In the field of such pharmaceutical products as are listed in the *United States Pharmacopoeia*, it has been found desirable, in the case of certain products that are peculiarly susceptible to light, to specify the use of light-resistant containers defined in the USP as "A container which is opaque or designed to prevent photochemical deterioration of the contents beyond the official limits of strength, quality, or purity under customary conditions of handling, storage, shipment, or sale."

In the field of vitamin products especially, a greater consciousness on the part of manufacturers of such preparations concerning the deteriorative effect of light has become apparent.

Such changes as are effected by strong light and sunlight ranging from fading of color to spoilage of numerous food products of an oily nature, are too well known to amplify, but since most chemical changes are accelerated by the presence of light and heat, it becomes obvious that protection against their influence is to be considered.

Light, heat and moisture in combination are undoubtedly the most common everyday hazard for a wide range of different classes of merchandise.

Some bottles may, under test, appear perfectly to contain a liquid under normal conditions, but when holding volatile material, losses may occur at higher temperatures due to increased vapor pressures.

The factor of insect penetration is often overlooked in developing what might otherwise be an ideal package for the particular product.

In the case of liners for closures of bottles which often are made of chemically active materials, it may be found necessary to determine if there is any reaction, if there is impairment of contents or closure material.

Again we have these destructive agents ever present to exert their influence, especially under conditions of warmth and humidity favorable to their growth.

Often a protective material may ultimately be found defective with respect to some component in its manufacture impossible to identify by chemical test, and yet sufficiently active to contribute an "off" taste, flavor or odor to the contents of the package.

For many years the conservative manufacturer proceeded along the lines of fundamental common sense. It has not been an uncommon occurrence for manufacturers of nationally distributed goods to subject their merchandise to tests in extremes of shipping and transportation to zones of high and low temperatures and high and low humidities; to transportation handling that tests not only the effect of vibration, but the strength of the package.

Beyond this, some manufacturers have subjected merchandise to trial sale in different zones of distribution before any advertising program is adopted.

Testing package materials and packages

by C. A. Southwick, Jr.

Unit tests of packaging materials are useful as quick and sure methods of maintaining quality in both the supplier and the user plants. Material and package tests are also necessary for purposes of research—to study production and improve quality.

The number and kinds of tests needed to define a substance are determined by the complexity or functional properties of the material. While many unit tests are performed at 73° F. and 50 per cent R. H., it may be desirable to conduct others at a special temperature or humidity level. In the case of frozen products, tests should be made at 0° F.; for products going into the tropics, tests might be made at 120° F. and a humidity of 90 per cent.

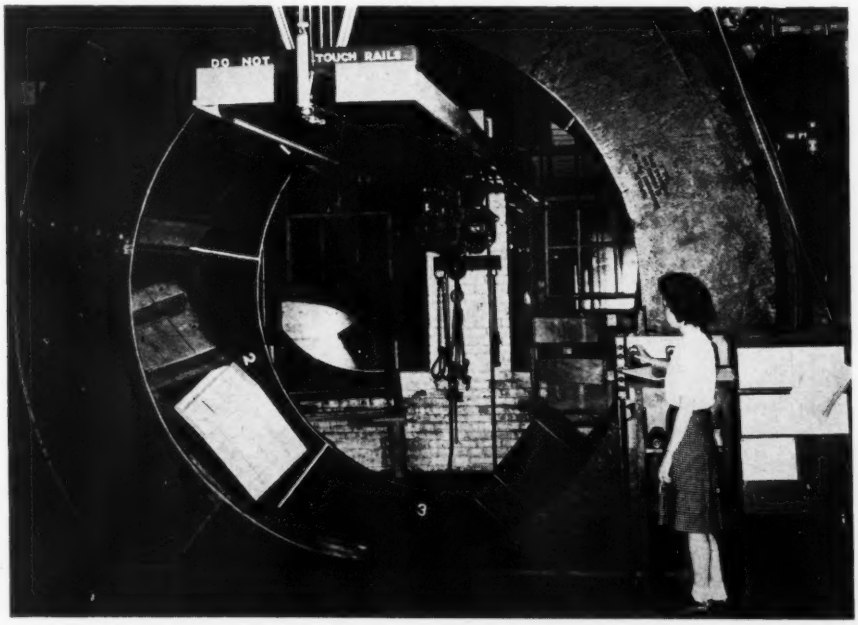
In general, unit tests must be integrated with the tests on the package, the composition of the product, and the conditions and place of handling and use. Nearly anyone can follow the techniques and perform the manipulations needed to obtain test data; however, the choice of the test and the application of the result require good judgment and some depth of experience.

It should be recognized that a test method may be a useful index of performance only to a limited degree, and that a change in the packaging material or the product can alter this relationship. When this occurs, new test methods must be found which will again serve as indices of performance. The establishment of this relationship for a package is a serious matter and it should be decided only after very complete trials and observations both in the laboratory and in the field.

The first imperative for a testing method is that it be reproducible. The second is that the values reported must serve as a useful index of some phase of package performance. For example, if wet-strength paper has been found to fail in use as the wrapper of a damp product during a quick-freezing operation, a control method using either a bursting test or a tensile test on wet paper will make it possible to set values on the basis of which the supplier should be able to eliminate that particular failure. It is also important that the test method produce numerical results so that data can be recorded.

Material tests

Tests of mensuration—This group of tests is confined to determining the sizes of materials—briefly, dimensions and weight. Many packaging materials change their dimensions and weight with changes in the temperature and humidity of the air, but for most practical or control purposes these changes are too small to be important. However, this lack of dimensional and weight stability should not be forgotten and precise measurement must be made at standard conditions and with suitable preconditioning. The Technical Assn. of the Pulp and Paper Industry (TAPPI) method of making basis-weight and area tests should be adopted for all packaging materials. The determination of weight per unit of area is a simple matter and requires only a sample of known area and a means of weighing sufficiently sensitive to obtain an accurate value. Even though the method of making this test is simple, the method of expressing the result for papers has been confused by outmoded tradition and hallowed precedence. The paper trade practice of reporting paper as pounds per ream has become very confusing



1—Devices exist to simulate every hazard a package can encounter in transit. This huge drum at the Package Research Laboratory tests boxes for ability to withstand falls at all angles. They fall 6 times with every revolution of the drum.

because of the varying size (area) of a ream of different types of paper, and because paper and paperboard are such an important and large part of packaging. There is a different size (area) of ream in use in each branch of the paper industry and the resulting confusion has caused many errors and losses of material. All packaging materials should be reported in terms of *pounds per 1000 square feet* of area and also in *square inches per pound.* These rational and simple bases would make it easy for both the manufacturer and the user to determine and to compare cost per unit of area (i.e., yield).

While the area and weight determination on the original sample are very simple, this test gets more involved as it becomes necessary to measure the weight of the various components of a structure. For example, the determination of the components of a lacquered, one-sided laminated glassine requires a very careful technique and an ingenious combination of methods. Nevertheless such data are necessary for writing an adequate physical description or specification of a packaging material. Incidentally, it is well to bear in mind that commercial materials may vary from sample to sample and (perhaps to a greater degree) between production lots. Such variation will be infinitesimal in dimension (area) but can be serious in weight, especially for experimental or very complex structures. However, there should be no hardship to either producer or user if the accepted tolerance ± 5 per cent is allowed from the specified weight.

The determination of thickness is a quick and simple test, but one which should follow the sound engineering principles as described in TAPPI methods. Specific gravity or density tests depend upon a careful measurement of volume (i.e., thickness). The values for density should be expressed as pounds per cubic foot, while the value of specific gravity is a ratio (of the density of the material to the density of water at a specified temperature) and can be expressed as a simple numerical value.

Mechanical tests—The second class of tests under the heading of "material tests" covers the most important and commonly used tests for determining certain kinds of mechanical properties. Most of these tests require specialized apparatus and rigid techniques and should be performed at the standard TAPPI conditions of temperature and humidity (73° F., 50 per cent R.H.). However, control of quick tests made without atmospheric control are useful but should not be used for research or arbitration.

It is evident from the test name what property each method measures, but it does not follow that each of these properties as tested is a factor in package performance. This is true because some test methods give arbitrary values which are not directly related to any package property. Such tests are the folding endurance and flexibility tests in this group. The results of these tests are numbers which must be used in a comparative way or which are some useful index of material or package performance. Other tests in this group are bursting strength, tensile strength and tear resistance and are reported as the force or work required to burst, break or tear the sample. Such values are primary or direct indices of these properties either in the material or the package.

The other tests in this group are: elongation or degree of stretch, porosity, pressure and heat blocking, melting range and sealing strength.

Elongation or stretch is a necessary property of materials for some packaging uses. Materials which are to be stamped or similarly handled, or which may encounter quick stresses, should possess some degree of stretch. However, for some uses, the amount of elongation should be kept to a minimum because dimensional changes of this nature during processing would affect printing register.

Porosity tests are useful for some kind of packaging materials but of no value for materials which are heavily coated, or for transparent or plastic films. Porosity is expressed as the length of time it takes for a fixed volume of air at known pressure to pass through the sample. This test measures the freeness of a material structure in terms of air-transmission.

The determination of the pressure and heat-blocking characteristics of a material is important in storage and in machine operations. This test is performed by using two strips of a sample under a known load at a controlled temperature and for a limited time.

The test for the melting point or range is a simple test made by techniques established by commodity industries.

Sealing strength is important now and will become more so as stronger and more functional packages are made. The test can be made by measuring the force necessary to separate a known length of seam. The preparation of the seal, the way it is separated, the rate of pulling, and the temperature and humidity are important variables which should be standardized.

Visual properties—Gloss is the property of a material in terms of its specular reflection of light. The methods of determining its values are therefore optical, and there is much equipment for performing this operation.

The next property of materials in this group is smoothness, which can be defined as the degree of perfection of the material surface as compared to a perfect plane. This test is made by measuring the time for a given pressure of air to leak between the material and an optical plane. In other words, if the material were as smooth as the optical plane, there would be no air leakage. Smoothness is indicated (a) under no pressure, and (b) under pressure, because of the fact that in printing and certain other operations, the pressure involved can compress some materials to greater smoothness.

Transparency can be defined as the degree of clarity of a material. The material is opaque if it is like ground glass which transmits light, but through which type cannot be read; if it is like clear glass, it is transparent.

The measurement and differentiation of color is a very difficult and complex process requiring much equipment and skill. Most color tests, however, are made by comparison against standard samples or color standards. It is possible to evaluate color precisely by means of the spectrophotometer which analyzes a sample in terms of its reflection of light over the visual spectrum. With this equipment it is possible to specify color on the basis of dominant wave length, purity and visual efficiency.

Chemical tests—This group of tests is necessary to es-

tablish the protective qualities of a material in terms of certain functional requirements.

The determination of the permeability of a material to gases or liquids is actually reported and performed as the migration rate of the gases and liquids through the material. There is little difference in the apparatus or the technique for most of these tests. Actually, there is no standard method for some of these tests.

All of these tests consist of measuring either by volume or weight the quantity of active agent which passes through a sample diaphragm in a given length of time and under carefully controlled conditions of temperature, pressure and humidity.

It is also important that the absorbing means or pressure differential across the diaphragm be reported. This whole group of tests is very important and is the basis for better and lower cost materials and packages.

The remaining two tests of this group, for water penetration and for oil and grease penetration, have been standardized by TAPPI. In both these tests the results are expressed as the time in seconds for water or the test liquid to penetrate through the sample at a given temperature and humidity. The stability of a material is important in terms of its ability to retain its strength and functional properties, and also to keep its shape and weight in storage and in use. Light, heat and age affect nearly all materials to some degree. It is necessary to know the extent and rate of such changes under various conditions. In order to determine these data, part of a sample is usually tested for several important properties and then the rest of the sample is exposed to controlled conditions of light or heat or oxygen concentration. After a suitable interval of exposure, the sample is retested. The difference can be reported as the percentage reduction of that property under the conditions of the test.

The test to determine the dimensional and weight stability, as to time and under various conditions of temperature and humidity, is performed in a similar manner.

The ability of a material to resist burning is important for many war uses and also a few civilian requirements. The flammability can be reported as the rate of burning of a material, or as the temperature necessary to sustain combustion, but is often expressed as a comparison with a common or standard material.

Package tests

Mechanical—Proper attention has never been directed to the physical testing of inner containers or packages, despite the practice of testing shipping cases, wood boxes, etc., by means of laboratory tumbling methods based upon rotating drums. There is no reason why similar but less rigorous techniques should not be applied to folding cartons, fibre cans, paper bags and all other package forms. Certain of the rigid types of packages could also be subjected to some type of compression test to determine their load-carrying or stacking ability. Physical tests of this kind could be carried out at both low and high humidities. The result of tests of this type, when properly correlated with tests of the package materials, would make it possible to establish workable indices of many of the material tests. Also such data could be used in writing performance specifications and would be useful in a research program.

Chemical—Laboratory evaluation of ability of a package to deliver contents in usable condition, depends upon test methods which use controlled atmospheres. These atmospheres are selected so as to simulate severe storage conditions and will give final results in a relatively short time. The degree of acceleration depends on the product, the packaging materials, the type of storage, exposure, and the approximate location of the marketing area. Each of these phases must be known and the final answers will

2



2—Testing the finished package is important even when the materials have been tested in sheet form. Hot-moist cabinets such as this one in use at the Washington Quartermaster Depot, can approximate different temperature and humidity conditions.

Package and Materials Testing*

Materials Tests

A. Mensuration
1. Area
2. Weight per unit of area
   (a) of base
   (b) of added material
3. Caliper or thickness
4. Specific gravity or density

B. Mechanical
1. Bursting
2. Tensile
3. Tear
4. Fold
5. Flexibility
6. Elongation
7. Porosity
8. Pressure and heat blocking
9. Melting Range
10. Sealing strength

C. Visual
1. Gloss
2. Smoothness
   (a) no pressure
   (b) under pressure
3. Opacity
4. Transparency
5. Color

D. Chemical
1. Air and fixed gases
2. Water
   (a) absorption
   (b) penetration
3. Water vapor
4. Oils and greases
5. Organic vapor
6. Resistance to special agents
   (a) war gases
   (b) solvents
   (c) acids, alkalies and chemicals
7. Stability
   (a) effect of light, heat and age
   (b) dimensional and weight
8. Flammability

Package Tests

A. Mechanical
1. Mechanical
2. Tumbling and drop
3. Grease penetration
4. Flavor loss
5. Water
6. War gases
7. Oxygen and other fixed gases

B. Chemical
1. Moisture migration

*These represent some of the more important types of tests. As a result of them, good material specifications could be written. Some materials require all tests, others those which outline their properties.

determine how much the storage of samples can be accelerated. For example, paraffin wax is an important part of many packages and a material of established usefulness. It is obvious in this case that the temperature of a test cabinet should not be high enough to melt the wax or to alter the physical condition of the package because change of this nature would affect the protection. Certain products can be preserved only below a given temperature. Thus it would be unfortunate to test frozen food packages at a temperature above their melting point.

For most products, the raising of the temperature and the humidity at a very high or low degree of saturation is a proved reproducible means of obtaining valuable and sound data on package performance in the laboratory. In fact, data from such tests alone, if intelligently used, are sufficient to determine the most effective package. One or two rooms or cabinets properly constructed, controlled and operated, form a scientific basis for package evaluation as compared to the method of field trial. The field trial is expensive, long, not reproducible and may be misleading because of unusual weather.

For products to be sold from the open shelves of retail stores in continental United States, a temperature of 100° F. or 37.8° C. has proved to be entirely satisfactory. If the product is hygroscopic or dry, or can be deteriorated by excessive moisture, then the humidity level should be held at 90 per cent R.H. For products which carry a high moisture level or which can be spoiled by becoming dry, the moisture content of the air should be kept at about 40 per cent R.H. Products which are to be shipped into or through the tropics might better be tested at 120° F., using the same levels of humidity.

The construction and control of good package testing cabinets or rooms is more difficult and expensive than most people realize. Any apparatus controlling humidity must be designed and built by competent engineers. Home-made units and those converted from refrigerators and ovens are short-lived expedients which require constant attention and invariably spoil valuable samples. A properly designed cabinet should not cause precipitation of moisture on the packages at any time, since water is not a hazard in commercial practice with goods sold from open shelves. Also the air velocity around the packages should be very low. These two requirements, plus the fact that at 100° F. and 90 per cent R.H., water vapor has a pressure about 9 oz. per sq. in. greater than normal atmosphere, show some of the problems in cabinet construction. Package testing equipment bought from an experienced maker, together with good control instruments and materials, give the most in satisfaction.

There are two other points which always come up in discussing package-testing equipment. One is whether to use a cabinet of volumes up to about 60 cubic feet, or a room of much larger volume. This is a matter of cost, space and volume of samples since either type of accommodations can be made to operate at the same conditions. A room should not be built merely to give space for someone to weigh and inspect the samples as this can be accomplished much more comfortably and efficiently elsewhere, especially if the test atmosphere is held at 100° F. and 90 per cent R.H. For all practical purposes except in case of a large volume of samples, the cabinet is much easier to operate and much lower in cost.

The remaining point is whether a testing atmosphere should be held at a fixed value of temperature and humidity or should uniformly vary these conditions by means of a predetermined cycle. Control equipment has been on the market which makes possible any variation of temperature and humidity in the cycle and any number of complete cycles per 24 hours. There are some limits on the possible rate of change of temperature because of the danger of precipitation of water and also because of the heat capacity of the "load" in the chamber. A chamber having such a cyclic controller is very expensive and difficult to build and if not used with great discretion can give very misleading and valueless data. The main reason advanced for the need of a cyclic chamber is that it simulates the daily changes of temperature and humidity.

However, packages spend part of their life in warehouses where little temperature change occurs and the rest of their life on shelves in stores or homes, where temperature and humidity changes are less than in the outside air. A cyclic controlled chamber is not advised or necessary but if available should not be operated through more than two cycles per 24 hours, and temperature and humidity changes should be kept small.

All products show some change in state or composition

3



3—For a complete and careful testing of the materials which go into packaging, and for the development of new materials, suppliers often maintain complete research laboratories. This new unit is at the plant of National Starch Products, Inc.

in the process of deterioration with age and the proper choice of the means of following breakdown can simplify the work and ensure the accuracy of the final conclusions. For example, one means of measuring the condition of baking powder is by measuring the CO_2 content but unfortunately this product is well on the way to complete spoilage before CO_2 loss occurs in a package test. Since CO_2 release can only occur when baking powder goes above a certain moisture content, the simplest index of the protection given by the package is the amount of moisture picked up by the powder.

Products which contain fat or oils could be examined for increase in oxygen absorbed, but some types of packages may show oil stain and become unsalable before product deterioration is effected. Fortunately, most products and packages can be tested for gain or loss of moisture content and this simplifies both the procedure and the supplementary equipment needed. On this basis not less than a dozen packages of each kind are filled from a well-mixed batch of typical product. Both product and packages should approximate the commercial standards.

Each package should then be indelibly coded and weighed on a gram balance to the nearest $\frac{1}{10}$ gram. They are then placed in an atmosphere which will cause a large change in moisture content. Each package is quickly weighed in the same manner at the same time each day or week or whatever interval gives an easily weighable difference. After a short time the packaging materials come to moisture equilibrium and after that the weight change of the package usually follows a uniform rate and all of the weight change represents moisture gained or lost by the product. Very rarely is a product encountered which has enough loss of volatile matter or gain by oxidation to affect the accuracy of this method. Such products must be tested by a technique based on these extraordinary constituents. In every case the testing time should be long enough to render either the package unsalable or the product unusable.

The index of the protective qualities of each package type is the average weight change of the packages for a given period after arriving at a uniform rate of weight change. This method of using gross package weight changes as an index of performance is criticized by those who prefer to follow the change in the actual moisture content of the product. The method of following changes in the moisture content requires much more care in preparation of uniform samples for analysis and much more labor, time and extra equipment. Although, the method produces excellent results if carefully followed. as a check the method of gross weighing should also be performed on the same samples.

Penetration or absorption of grease or water into package materials produces discoloration or softening.

A simple test method is to store the samples until the package becomes unsalable or unusable. In these cases there is no need to weigh the samples and comparisons can be made on the basis of the time required to show failure. Either grease or water in a product *must* be held by that part of a package which is in contact with the product (i.e., the liner or lining surface).

Flavor loss can best be measured by taste and smell tests before and after being exposed to storage.

It is advisable to hold control samples at low temperature so that direct comparisons can be made after various intervals of storage.

The testing of packages for penetration of, or deterioration by, various gases is an obscure and little publicized subject. War gases appear to render unusable all fibre packages but test methods for evaluating these susceptibilities have not been outlined or standardized.

The degree of usefulness of any material test is determined by whether or not it is a good index of some phase of package performance. Many material tests are of limited usefulness in the final evaluation of a package.

Packaging tests are the means of evaluating package forms, types and combinations, in terms of their functional properties and future performance under severe conditions. They are best performed when using an atmosphere of controlled temperature and humidity at levels which cause deterioration of product or package.

Recommended atmospheres are: 100° F., 90 per cent R. H. for hygroscopic products; 100° F. 40 per cent R.H. for products with high moisture levels; frozen foods 0° F. low humidity. These conditions provide acceleration of the test without change of state of most products or any practical packaging material. There is no need for cyclic control of atmosphere, which must be used with discretion. Simplest technique uses weight-change of filled package over a period of constant rate of gain. This value becomes an index of package performance.

Consider production when designing

by H. F. Brownell

It may be taken for granted that the production line will be expected to play an important part in helping to meet competition when we return to the normal competitive conditions—in the near future, we hope. War has taught us to do with makeshifts in equipment and substitutes in material and labor. But production line principles remain the same, and production requirements are still a paramount consideration. New packages may come, but it is very unlikely they will alter the principles on which the production man depends to maintain speed and keep up volume output.

The primary consideration, of course, is whether or not the container selected will move along the various conveyors without jamming or tipping over. Will it go through the machine to receive its charge of the product? Packagers who are able to secure from manufacturers packages of the same shape they formerly used are indeed fortunate, since their machinery will be adapted to handle it. Sometimes the new container is not acceptable by the machine without alteration or rebuilding of parts. The production facilities of the packaging machinery people are for the most part already overtaxed, and there is no time for the creation of new parts for their own base machines. Many packers are, therefore, unwilling to accommodate a new type package which necessitates changes in their machinery.

A new package usually incorporates a new cover or closure which can seldom be adapted to the closing mechanism of the original package. This very often means that closing operations will have to be performed by hand. Still further along the production line, the label must be attached—if it has not previously been affixed by the container manufacturer. Fortunately, however, labeling machines can frequently be readily altered.

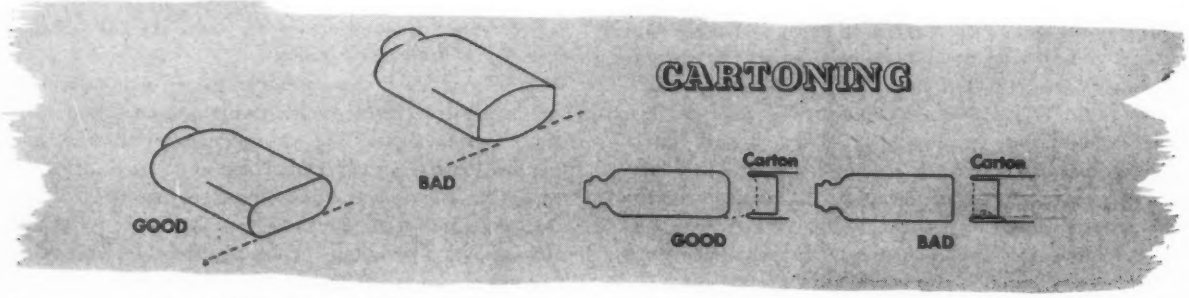
The appearance of a package must not be permitted to interfere seriously with practical or economic functions. Sometimes it has been found that extra costs have been incurred which could have been prevented by making some minor change in package structure or design. Often floor space can be conserved by the selection of collapsible boxes rather than set-up type, and telescope containers also occupy less room than others. In some industries containers, packing material, corrugated cases, etc., are each purchased from different concerns, requiring multiple storage space, while in other industries, such as the bottle industry, one source of supply provides the entire required unit, which is a preferable condition.

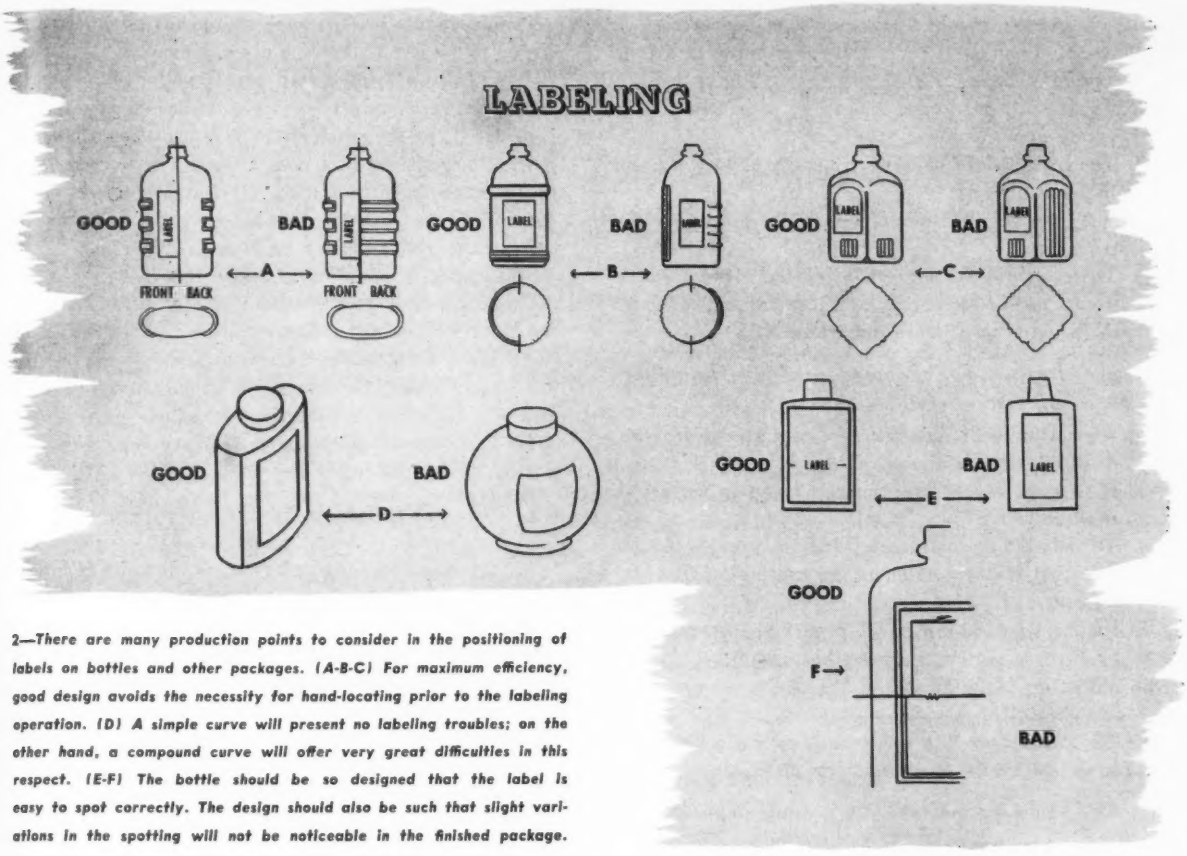
It is the job of the packaging engineer to consider and weigh all factors in choosing a package, which, after meeting the requirements of the contents, will meet production requirements necessitating the least adjustments.

The chief objects of production are:

1. To assemble in the most efficient manner possible—
   a) Space is at a premium in most factories and a package should be produced in the least possible amount of floor space.
   b) Any good production man wants as many units as possible pouring out each hour.
   c) All supplies should be immediately available.
   d) Supplies should be on the same floor with the assembly or accessible with little handling.
   e) Every production man's dream is straight-line production. Production can be in "L" shape or "U" shape and still be straight-line production as long as breaks or bottlenecks are avoided.
2. To produce at the lowest possible cost—
   a) The production man's basic thought is to be able to assemble a particular package with the least possible amount of labor.
   b) Waste should be reduced to the minimum.
   c) Just as important as an even flow of raw material to the packaging lines, is the smooth disposal of finished goods coming from that line. This can be accomplished by chutes or skids on platform trucks, etc.
3. To anticipate future handling of the package—
   a) One never knows just what the result in sales will be when a familiar package is changed or

1—For bottle design: (Left) A flat side which will not rock is the most desirable for cartoning purposes. (Right) Allowing for an ample radius on the base of the container will aid in satisfactory cartoning. This will permit it to slide easily, smoothly and quickly past the edge of the carton.





2—There are many production points to consider in the positioning of labels on bottles and other packages. (A-B-C) For maximum efficiency, good design avoids the necessity for hand-locating prior to the labeling operation. (D) A simple curve will present no labeling troubles; on the other hand, a compound curve will offer very great difficulties in this respect. (E-F) The bottle should be so designed that the label is easy to spot correctly. The design should also be such that slight variations in the spotting will not be noticeable in the finished package.

replaced by a new one. The production man is mindful of this and in his first planning tries to think of what would be necessary should the conditions change.

Whenever a new package is created and production is being considered, the production man naturally breaks this package down into its component parts and makes a study of each to see how it will go through his line.

Choice of container—Of all the components of a package, the container represents the starting point. The following factors are of primary importance to production:

1. No part of the container should be deceptive in appearance.
2. It should be the proper size and shape from the consumer's point of view.
3. It should be of the proper size and shape to move freely along the conveyor.
4. It should not pile up or jam anywhere along the production lines.
5. It should be able to go around curves or be pushed without breaking, chipping or encountering mechanical difficulties.
6. The opening should be large enough for filling.
7. The opening should be convenient for removal of the contents.
8. It should have the proper label space available.
9. It should be constructed sturdily to withstand traffic conditions and be free from breakable parts.
10. It should have no feature which would prevent its being assembled by a fully automatic machine.

The WPB has been alert to the many sizes and shapes of bottles manufactured for various packages, and the Board has done a lot to simplify this situation by the issuing of orders to reduce the number of containers. This has worked out to the advantage of the bottle manufacturers and, in the long run, to the packagers of those bottles.

Choice of label—When a production man sees a label he studies it carefully in its relation to the rest of the package and with the following thoughts in mind:

1. Oddly shaped or freakish labels should be avoided.
2. The label should fit properly into the label space on the container.
3. The back of the label should be of such quality that it will adhere properly to the container.
4. Consideration of a label implies also the adhesive used with it, because the product has to be stored in hot places, cold places, damp places and dry places and it is not unusual for certain types of adhesives to crystallize or become damp thus allowing the label to come away from the package. The same type cannot be used for a tin can as for glass, varnished surfaces or corrugated cases.
5. It must be possible to apply it by machinery.

Choice of closure—The following requirements come into a production man's mind:

1. The closure should fit the container properly.
2. It should make a tight seal, effective over a long period of time.
3. The resealing features should be satisfactory from a consumer's point of view.
4. The liner should be of such quality as to withstand deterioration.
5. The liner should not contaminate the product in the container.
6. There should be no feature of the closure which would prevent its being applied and tightened by the usual type of closure machine.

Choice of carton and wrapping material—The following details must be carefully worked out:

1. The carton itself should not be deceptive in size but should fit the container it holds.
2. The carton should be sufficiently heavy to withstand abuse in traffic.
3. All details of construction of the carton should be such that it can be run on the available cartoning machines.
4. The package should be of proper shape and construction to permit wrapping by machinery.
5. Wrapping material should be of the correct type and weight for the purpose.
6. The right type of adhesive or sealing mechanism should be available for the wrapping material.

Choice of packing material—In picking materials:

1. Packing materials should be selected of the proper quality and type to protect the package on its journey to the ultimate consumer.
2. The finished package should comply with all Interstate Commerce Commission regulations.

Machinery

When considering a new package, the production man must visualize the assembly in the factory, giving close attention to the machinery involved.

If there are any lines of machinery in the factory which are not employed to their full capacity, the details of construction of this new package should, if possible, be adjusted to the use of this line of equipment.

Practically all sales start small and then expand—sometimes very rapidly—so when the machinery is being considered for the production of any package, it is important to get some idea from the sales department as to future requirements. If there are certain periods of the year when the package may have greater sales than at other times, this calls for peak production.

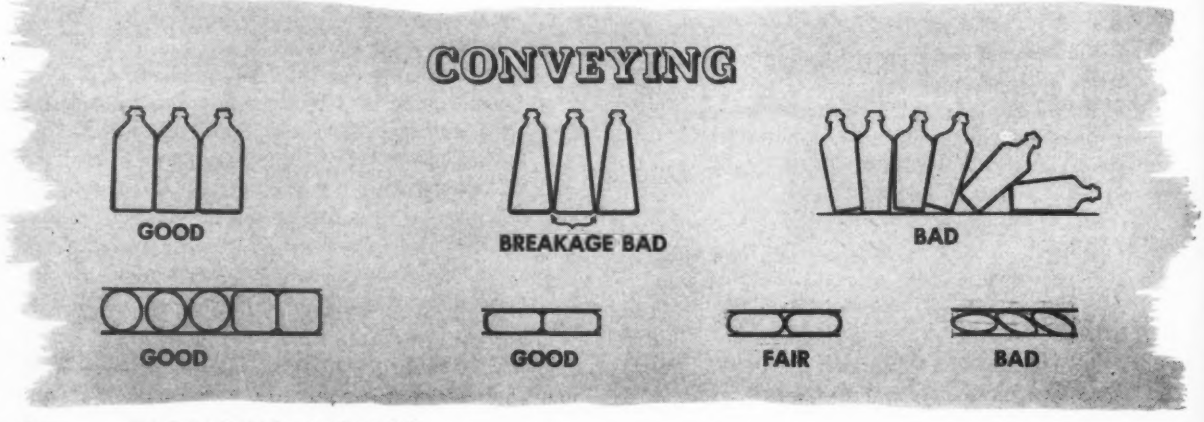
The matter is complicated by the fact that so many of the machine tool people who formerly furnished their machines for general industries are now very busy with Government work and deliveries are delayed six months to a year. Further, the shortage of metals in the industry delays manufacture of whole machines and parts.

The purchase of additional machinery should be considered on the following two points:

1. Tools and equipment are absolutely required to produce some articles of commerce. The greater speed of production obtained from machines is required to meet the sales demand. The manufacture of many things would progress very slowly if the operations were done by hand.
2. Considering factory costs—that is, how much will be saved—studies should be made to determine the output of a machine. Management should know the exact cost of making each unit or thousand units by hand and then, if the volume is sufficiently large, it is in a position to state whether the expense of buying the equipment will be offset by labor savings.

As this article is being compiled, it appears that the machine-tool people are catching up in their production. This should make possible, in the near future, the acceptance of new orders for packaging equipment. Many of the substitute packages have defects, and for that reason many manufacturers would not like additional equipment for the substitute packages. Each manufacturer should study his own requirements and make certain what containers will be available before he places his order for additional equipment.

3—Design for ease in conveying: (Top, left) These bottles cannot tip. (Top, center) In this case, a single point of contact is apt to cause breakage. (Top, right) High single point of contact will cause tipping. Bottom row) Oval shapes turn and wedge while rectangulars and rounds do not.



Selecting package colors

by Herbert Kaufman

If you ask someone "What is your favorite color?" you will probably get a definite answer. But if you ask "Why?" that is another matter. Almost everyone is susceptible to likes and dislikes in colors. Sometimes preference is the result of a definite association of ideas. More often there is no substantial or logical reason in the mind of an individual for liking one color better than another.

A great many conversational theories regarding color fashions, trends and psychology are found to be ephemeral when the question of color selection becomes specific, and the choice remains a baffling problem. The value of eye appeal in promoting sales is well recognized. Package designers are constantly striving to improve upon the accepted uses of color. Because its appeal is largely an emotional one, there is no exact recipe for improving its application. The designer who manipulates color to best advantage, however, usually attains his success on the basis of experience and good judgment.

In an effort to get the opinion of leading American authorities, the General Printing Ink Corporation has conducted a special survey on the matter of color. In this line of endeavor perfect unanimity of opinion could hardly be expected, nor indeed would it be desirable. An interesting array of ideas came in response to the following four questions:

1. Does the type of product influence the selection of color for the package?
2. Are certain colors chosen to make the design more effective from the standpoint of eye appeal?
3. Is thought given to the resulting pattern on the shelf and window setups displaying the package?
4. Is a functional reason responsible for the designation of color in packaging?

The answers have been quite stimulating and enlightening. Important names have been heard from—Frances Cushing Hall, C. O. Woodbury, Russell Grau, Egmont Arens, Thomas D'Addario, Louis Koster, Joseph B. Federico, William O'Neil, Joseph Carter, Charles Cruze, etc. Their comments are given herewith, anonymously.

One designer feels the first thing to consider is relation of color to the contents of the package. For example, the color for a face powder package must suggest daintiness and beauty. Delicate pinks, greens and soft blues could be used. Gold and silver suggesting value could also be appropriate. Pink would have the widest appeal used on cosmetic packages.

The type of consumer to which the product is to be sold is also a very important factor in deciding what color to use. If a product is to appeal to the great mass of middle class purchasers it cannot employ the unusual, high-style colors possible for a small but expensive distribution. In the above example pink and green would have a wider appeal than magenta and gold.

The color scheme is very dependent upon the position of the package when it is seen by the customer. A more contrasting and bright color arrangement is possible and desirable when the packages are on a shelf six or more feet from the customer than when the package is to be seen in a showcase close by. In the former case, the colors must be sufficiently contrasting for easy legibility.

When numbers of packages are to be displayed together as a usual thing, a design that makes a pattern with the group is highly desirable. This would be true for dry cereals, for example.

Often color for a package is chosen to enhance the color of the product. A dark blue-purple makes the contents of a package seem whiter.

Color has to change as the colors for interior decoration vary. When towels and bathroom fixtures are delicate in color, bright red and black packages seem out of place so are not desirable. The same thing is true for food packages but not to quite such an extent.

Colors used in food packages should have an edible quality, that is, they must either suggest delicious food or be complementary to it. For example, yellow is appropriate for a package for poultry seasoning because yellow makes an appetizing background tone to accompany a roast chicken.

It has been my experience in package design that the product itself often suggests or even dictates the color or colors to be used. Color is usually used for eye appeal, often as a force to command attention.

I would say that the resulting color pattern on shelves and in window display arrangements is a possible consideration, but not so important unless one is using a number of colors, in which case the general effect is the thing studied.

A good package design, in my estimation, is based on practicability and eye attraction. Printing, packing and shipping problems should be considered first. Eye appeal should be the next consideration. The third step should be legibility. I always look at the competitor's packages and try to make my design as different as possible.

There is no doubt that color plays a big part in eye appeal. After 20 years of experimenting with people and their color tastes, I've come to the conclusion that people, much as I dislike to admit it, like the bright, primary-type colors. The subtle tones and odd shades of color combinations are lost on the average person. Bright colors and strong contrasts are always popular.

A pattern resulting from window or shelf setups is good and should be kept in mind, but not to the point of sacrificing the design of the individual unit.

Whenever there is a trend in packaging, I change my style to be in contrast to the trend. The only rule I would advocate in regard to color is to achieve distinction: For examples, let's go to nature. *(Continued on next page)*

1. Color suited to product is not very important save as a sentiment in the manufacturer's heart. A red coffee package will outsell a coffee-colored coffee package every time. But look out for poisonous-looking green on food packages!
2. High-vibration colors are certain to get more attention than low-vibration colors. This is true regarding shades of color too. A brilliant blue with violet tinge will stand out against a blue-black.
3. In certain items that are displayed in stacks, stack appeal is more important than individual package appeal. I remember a package that looked beautiful by itself but when stacked looked like a lot of worms, owing to a ribbon effect used in the resin. I never let a customer decide on a package until he has seen stacked multiple dummies.

The choice of color is also dependent on competition. If, for instance, in planning a new design for a coffee package I found that most of my clients' competitors were using a color scheme of dark brown, light brown and red, I would attempt to create something different in design as well as in color scheme. I might retain the brown and use, in addition, golden yellow and black. The juxtaposition of colors in certain ways can be made to add attractiveness and distinction to the package.

Every packaging job that has come my way has brought with it a long background of traditions, preferences and so on which could not be ignored. Indeed, treated sympathetically, this background has invariably proved the rock on which the more successful packages were built. Here are a few examples:

1. A specific red and a certain green had to be used as the product's chemical content precluded the use of other colors. This package was one of the Gold Award winners of that year. The client still rates it a winner.
2. A family of ten, each with a color all its own, exhausted the scale of primary, secondary and tertiary colors suitable for packaging use.
3. A brilliant red and a dark blue are hard to beat at any time, but when the name on the package of itself stirs memories of 1776, what alternative colors could one choose?
4. In the cosmetic field, an older product was packaged in a grayed blue. Obviously, for the new baby a misty rose was chosen.
5. A package to be redesigned was overdecorated, overworded and too vari-colored. Design and copy were streamlined, a fine cherry red and golden yellow retained. Now, recognizable to old friends, inviting to new, our hero steps out.

The type of product definitely influences the color of a package. For example, in the packaging of auto parts, you might consider a combination of orange and black, because they are strong colors, but you would not consider this combination for cosmetics, where you are attempting to create a feeling of refinement. The type of customer you are attracting has a bearing on the color scheme.

In the creation of a design, not only the size of the package and the design are considered at one time, but color as well. It is well known that color can be used to create entirely different atmospheres, thus making it difficult to separate design and color.

Quite a bit of thought has to be given to the resulting pattern on the shelf or window. A package must fit into its surroundings, and at the same time must attract attention. I believe that this is one of the most difficult problems in the designing of a package.

There is a functional reason for color in a package. It must help catch the eye, hold the person's attention, create a desire to buy, bear out the quality of the product, and fit into its ultimate surroundings in the home or wherever it is to be used.

First, the type of product has a very definite bearing on the selection of color as well as the use of the product. The price of a product also affects color selection. For example, products with an intellectual appeal go to a smaller market, must be priced higher. Color for this group is selected from the so-called intellectual range, and is determined on the basis of common sense and experience in matters of good taste. There is no rule that I know of save that if you have good taste, good merchandising sense, and a fair picture of your market, you can convince your client that the color of his product will agree with his market.

Secondly, colors are chosen to make design more effective from a standpoint of eye appeal by a complete study of competitive colors, sectionally and nationally. The experienced package designer has a "feeling" which is backed by experience and "know how" in arriving at his selection, though the answer is obvious when the package is displayed competitively.

Thirdly, the idea of pattern in display is, to my way of thinking, an additional distraction to force on the point-ridden consumer. The idea of display is to focus attention on the product and not on some galloping pattern that leads your eye to rest on the competitor's product. If a package design is good, it should stand by itself, just like a salesman. Customers resent ganging up on them by salesmen.

Fourthly, the question of function is similar to Question One. Soap should clean. If it cleans clothes, the color should suggest it. If it cleans faces in a particular manner —to give beauty or freshness, or to remove blemishes— an added thought must be incorporated into your color selection. If blue does the job for clothes, adding rose for skin freshness changes the range into purple—and if medication is suggested, you have a herbal or green range to combine with your purple. With this preliminary reasoning, you add your experience, judgment, knowledge of market in relation to consumer preference, etc., and you finally arrive at a color which the client's secretary doesn't like at all.

To sum it up, a really good package design job must be arranged and colored to convince the consumer that the product is right, is priced right, and will stay right in his eyes long enough for him to repeat purchasing many times through his lifetime.

XUM

XUM

Standards for Color Indentity

American Colorist: Designed by Faber Birren and widely used in horticulture, art and industry. Charts contain over 500 samples printed in 12 process charts. The Crimson Press, Westport, Conn.

American Standards Association: An important recent standard for color identification is that issued by American Standards Association, New York, *Specification and Description of Color*, Z44-1942. Approved by a number of associations and manufacturers, it recommends the use of the Recording Spectrophotometer, the Munsell System, and the Inter-Society Color Council method of designation.

Artists' Oil Paints: Minimum standards to assure satisfactory color, working qualities and permanence in oil paints used by artists. Adopted by a conference of manufacturers, distributors and users. Commercial Standard, CS98-42, U. S. Department of Commerce, National Bureau of Standards, Washington, D. C.

Baumann Color Guide: A card index system containing over 1300 standards, with extra booklet showing complete samples in smaller size. Original edition was in German, although an edition with English text has been produced. (Current source of distribution unknown.)

British Colour Council: A dictionary of 180 samples of dyed silk, used and accepted by British industry to standardize color names. Published in London.

Camouflage Colors: A series of nine colors used as standards by the Army. Specification T-1213, Supplement A and B, U. S. Army, Corps of Engineers, Washington, D. C. Also—*Color Card for Camouflage Finishes* issued by U. S. Air Corps. Contains 8 samples, including insignia red, white and blue. Air Corps Bulletin No. 21.

Color Kit: Designed by Faber Birren. Color identification is achieved through the use of discs and a mechanical spinning device. Numerical proportions are developed for all notations. The Crimson Press, Westport, Conn.

Dictionary of Color: Written by A. Maerz and M. Rea Paul. Shows over 7000 samples, with color names based on historical origins and current usage. Published by McGraw-Hill Book Company, New York.

Drugs: U. S. Pharmacopœia and the National Formulary designate the colors of drugs by name in their monographs. The National Formulary uses the ISCC-NBS system of color designations and about one-third of the monographs in the current issue of the *U. S. Pharmacopœia* uses them. Work is planned which will put the remaining monographs on this system. Description of the system and of the methods of applying it to drugs and chemicals are given in: *Method of Designating Colors*, RP1239; "Instructions for Determining the Color Names for Drugs and Chemicals," *N. F. Bulletin, 8*, 359 (1940); "Central Notations for ISCC-NBS Color Names," *Journal of the American Optical Society, 31*, 587 (1941); "Specification and Description of Color," *ASTM Bulletin*, p. 19 (December, 1942).

Du Pont Color Code for Safety: Designed in collaboration with Faber Birren. System contains 8 color standards used for purposes of safety and identification in industry. E. I. du Pont de Nemours & Company, Finishes Division, Wilmington, Del.

Flag of the United States: Scientific definitions of the red, white, blue approved by all departments of the Government, Section IV, *Federal Standard Stock Catalog*, Specification TT-C-591, July 3, 1934, Superintendent of Documents, Washington, D. C.

(The Textile Color Card Association has prepared samples of these colors, also the flag colors of the South American Republics.)

French Color Standards: Two widely used French sources for color standardization are: *Code Universel des Couleurs* by E. Seguy (720 samples), and special books published by The French Society of Crysanthemistes.

Hiler Color Chart: A system of color harmony and color identification in chart form. Later edition contains 162 samples with card index box containing mask matching apertures and showing mat and gloss finishes of the colors. Available through Favor, Ruhl & Company, Chicago and New York.

Historical Color Guide: A comprehensive review of traditional and period colors. Contains 146 specimens. Written by Elizabeth Burris-Meyer. William Helburn, Inc., New York.

Inter-Society Color Council: An effort to develop a standard designation for colors, using words commonly understood. Approved by various associations and applicable to widespread use in science, art and industry. *Research Paper RP1239*, U. S. Department of Commerce, National Bureau of Standards, Washington, D. C.

Lubrication of Machinery: A proposed code (1944) for the use of color as an identification in the lubrication of machinery. There are 5 color standards for oils and 3 for greases, to be used on containers, fittings, etc. American Standards Association, New York.

Munsell: The *Munsell Book of Color* is the most widely accepted system of color identification in the United States. New edition, in two volumes, contains 40 charts and over 900 samples. Published by Munsell Color Company, Baltimore, Md.

Nu-Hue Color Directory: An elaborately boxed series of color standards in actual paint—over 1000 in number, and all mixed from a basic palette of paint toners. Published and distributed by Martin-Senour Company, Chicago, Ill.

Ostwald: The Ostwald system of color, widely used in Europe, England and America, contains over 600 samples. Two series of standards are available, one produced by Winsor & Newton of London and New York, and the other by Container Corporation of America, Chicago, Ill.

Plochere Color Guide: One of the most complete sets of color systems ever produced in America. Contains over 1000 samples, boxed and indexed. Available through G. Plochere, 1820 Hyperion Ave., Los Angeles, Calif.

Poisons, Explosives, Gases: The Interstate Commerce Commission recognizes and insists upon special labels for shipment of gases, inflammable liquids, explosives, acids, etc. The colors generally used are white, black, yellow, blue, green.

Process Colors: Adopted (1927) by the Standardization Committee of the American Institute of Graphic Arts and approved by the American Association of Advertising Agencies and the National Association of Advertisers. Recommended standards for process red, yellow, blue, black.

Ridgway: The most renowned historical work in America. Contains about 1000 samples, each identified by name. Widely used by archaeologists and naturalists. Published by Robert Ridgway, Washington, D. C. 1912.

Textile Color Card Association: Seasonal color cards for the styling of consumer merchandise are issued at regular intervals to members. However, the *Standard Color Card of America*, Ninth Edition, contains 216 samples and represents staple colors having continual acceptance over the years in a wide variety of products and industries. This book may be used for reference on the following standards: U. S. Uniform Colors; Official Colors of WAC; Colors of Ribbons for Decorations and Service Medals; U. S. Flag Colors; Army-Navy "E" Pennant Colors; Standards set up by National Electrical Manufacturers Association and Radio Manufacturers Association.

U. S. Army Color Card: Army colors standardized for the different arms and services and approved by the Quartermaster General. Issued by Textile Color Card Association, New York.

U. S. Army, General Paint Specifications: A showing of 72 colors used by the Army in the purchase of paint and related materials. Supplement to No. 3-1, issued by the Quartermaster General, Washington, D. C.

U. S. Army Thread Color Card: Official color standards for olive drab, khaki and drab sewing threads with list describing use of each thread. Issued by Quartermaster General, Washington, D. C.

U. S. Army-Navy Aircraft Standards: A group of 15 colors used in the purchase of finishing materials for aircraft. Issued by the Bureau of Aeronautics, Navy Department, Washington, D. C.

U. S. Naval Medical Supply Depot: Standards have been established for the colors of slate green mosquito netting and wool blankets, dental smocks and dental towels, and Red Cross insignia for arm bands. U. S. Naval Medical Supply Depot, Washington, D. C.

U. S. Ribbons for Service Medals: General color specifications for the ribbons used on medals and decorations. U. S. Army, Specification 7-3B, Washington, D. C.

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Ellis, Havelock: *The Colour-Sense in Literature*, The Ulysses Book Shop, London, 1931. A rare item which analyzes the color predilections of great writers.

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dentity

Paint Specifications: A show- by the Army in the purchase d materials. Supplement to the Quartermaster General,

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Supply Depot: Standards have the colors of slate green mos- l blankets, dental smocks and l Cross insignia for arm bands. Supply Depot, Washington,

rvice Medals: General color ribbons used on medals and Army, Specification 7-3B,

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duce this chart or portion thereof in any form.

Preparing art for reproduction

by Herbert Kaufman

Reproduction of package design is simply quantity production of a piece of art work. The process involves color selection, a knowledge of graphic arts processes, and familiarity with methods of translating one into the other.

The word "color" suggests the entire scope of the spectrum plus black and white. To name a color is merely to classify it as falling within a certain range of wave length. We know, for instance, that red is characterized by a long wave length, and violet by a short one. Obviously, however, this information alone would not enable us to match or to reproduce a desired color. On the other hand, it would hardly be practical to designate colors by their specific wave lengths.

A practical system for describing colors accurately is of great importance in the designing of packages, and in the reproduction of design. No matter how expertly colors are chosen, lack of understanding or inaccuracy in reproduction may spoil the effect of the most exquisite work. Color can be described, for practical purposes, on the premise that all colors possess these characteristics:

1. *Hue*—the quality by which we distinguish one color from another, as, for example, yellow from blue
2. *Value*—the lightness or darkness of a color (as compared on a scale of grays from white to black)
3. *Chroma*—the strength of a color, or the quality by which we distinguish pure from grayed colors.

To qualify a color according to this system, we first describe its *hue*, say—green. Next we designate its *value*, that is—lightness or darkness. To complete the description, we give its *chroma*—whether it is rich or grayed.

Primary considerations in the selection of package colors are: visibility and legibility. These depend largely on simultaneous contrast of value. For best results, however, the effects of hue and chroma must also be given consideration. It must be borne in mind that a neutral gray of middle value appears lighter against black and darker when contrasted to white. The same principle applies, of course, to any hues.

The processes available for reproduction fall into three major classifications, according to whether the surface is raised, level or lowered.

Letterpress—Printing which comprises reproduction where the image to be printed is raised. Type, line cuts, halftones, bendays, stereotypes, electrotypes, tint blocks, rubber plates, wood cuts, linoleum blocks, etc., fit into this category and are the means of reproducing copy. The raised surface permits the inking roller to leave a deposit of ink which is then deposited directly on paper. Obviously, the plate or cut must be in reverse so that the image is positive on the paper. Sheet- and web-fed presses are utilized in this process. For halftones and four color work, it is necessary to use smooth or coated papers.

Planographic—In this process, the image is on the same plane as the non-image area, but the image is ink-receptive while the non-image section is made to be ink repellent.

The principle of oil and water not mixing applies in this process. In the early days of lithography, blocks of stone (limestone) were used, but today thin metal plates (aluminum or zinc) are the rule. The image is positive, since a transfer of the inked impression is made first on a rubber blanket and then on the paper—hence the commonly used term, "offset lithography." Some direct lithography, using the reverse image, is still practiced. Photolithography is the photo-mechanical method for making press plates. Two types of plates are used: albumin and deep-etch. The latter has an infinitesimally lowered image section. Most presses are sheet-fed (some web-fed), and almost every type of paper from rough surfaced to fine coated can be utilized.

Collotype or photo-gelatin—In this process the non-image areas are made ink repellent by allowing the exposed gelatin-coated plate to absorb varying amounts of a glycerin solution. Unlike the lithographic process, no water is used; the required moisture is drawn from the air. Another dissimilarity is that no screen is used, since the finely reticulated surfaces of gelatin produce a print closely resembling a photograph.

Intaglio or gravure—This process is just the reverse of the letterpress method. The image is below the surface and can be likened to inkwells. The reproducing plate or roller consists of regular (screen) or irregular (grain) etched impressions, or lines and dots engraved by hand. These are filled with ink and the surface is then wiped with a "doctor" blade, thereby removing excess ink. The inkwells or cells, which are of varying depth, then trans-

TABLE I.—EFFECT OF INKS ON COLORED STOCKS

Stock	*Good colored inks*	*Poor colored inks*
Yellow	Red warm green, orange, brown. Deep blue or violet may neutralize favorably to a deep black	Blue will turn olive. Purple will turn brownish. Cool greens turn grayish
Red	Red, opaque yellow, opaque orange, maroon, warm purple. Deep blue and purple may form black	Green will turn brownish. Blue will turn muddy. Yellow, if not opaque, will wash out
Orange	Red, rich orange, brown. Deep intense blue or purple may form black	Yellow will wash out. Blue will turn brownish. Green will turn olive
Green	Deep green, blue, violet, opaque yellow	Red will turn muddy. Orange will turn olive. Purple will turn dull
Blue	Deep blue, green, purple	Red will turn dull. Orange will turn muddy. Yellow will turn olive

fer their different quantities of ink to the surface of the paper (sheet- or web-fed).

Gravure differs from letterpress and lithography in that the gradation of tones is effected by varying the thickness of the film of ink transferred to the paper, rather than the size of the dots. However, in the new (Dultgen) halftone method of reproduction used in color gravure, the dots are larger for solids and the film of ink thicker that in the light tones.

In addition to these three major reproductive methods, there are others such as silk-screen, novaprint, thermographic, etc. It is best to consult an expert in the respective fields for advice on which to use. All processes have their advantages and disadvantages, depending on what you plan to achieve, and all produce different results.

Factors in selecting copy

Another thing to consider is that copy must be prepared differently for various reproductive processes. In general, copy that is good for one process is good for any of them. It should be half again as large as desired in the finished print so that it can be reduced a third in the camera. Contrasting photographic copy reproduces better than soft photographs. Type proofs should be clean and sharp and pulled from new type if possible.

For letterpress, photographic copy should be carefully selected for clarity and sharpness. The photo-engraver is practically helpless in trying to reproduce from poor copy. The camera eye is relentless in picking up defects, and a few dollars spent in retouching by an artist will often more than compensate the package for the expense involved. Avoid gray, non-contrasting shots.

Art work and lettering should be firm, sharp and clean. Fuzzy lines should be eliminated by the artist because while the engraver can reproduce them the process is usually more costly. If possible, try to include the type in the plate; if not, the electro should include the type. To be on the safe side, always send the working dummy to the engraver so that he will know what it is all about. Avoid fine delicate type, especially serif types, for reverse plates (in which copy appears white on black).

The most desirable copy is furnished all in one piece and is done in the same medium throughout. In other words, do not supply one piece of copy in water color and another in oil or Kodachrome and expect to get a perfect reproduction of each. Most houses rate media as follows: transparent water color, opaque water color, oils, pastels. Carbros are satisfactory if they are in register. Kodachromes are excellent if the shop has had experience. Colored photographs are usually less desirable.

Background tints or solids in gravure should be made with colored papers. Variations in air-brush or other means of laying in color, while not apparent to the eye, come up with discouraging results in the final print. The best method is to have the tint "flushed in" by the printer.

Legibility of color

Because legibility is an important factor in the success of a package, the following notes based on practical, scientific research are of value.

The most legible of all color combinations is black on yellow. White tends to blur, particularly in strong light, because of aberration in vision which scatters the bluish rays of light. In addition it lacks the attention value of pure spectral hues. Next to black on yellow comes green on white, then red on white, blue on white, white on blue, black on white, red on yellow. For fairly dim illuminations, typical of those found in retail stores, generally light packages are superior to dark ones for high visibility. This is because the deeper colors tend to recede.

Illusions caused by color

Another factor bearing on the finished package is illusions. Light areas will appear larger in size than dark areas. This is because the light area, focused on the retina of the eye, tends to create an active rather than a passive image. Its edge tends to spread out like water on a blotter, thereby giving the light color increased dimensions. According to research the largest appearing color is yellow, then white, red, green, and blue, with black the smallest of all.

In a similar way, bright and pale colors will seem light in weight, while deep colors will seem heavy. Generally, the light and warm hues will tend to advance and appear nearer, while the cool and deep colors will tend to retire. The reason for this is that the lens of the eye grows farsighted when focused on rays at the red end of the spectrum and nearsighted when focused on rays at the violet end. The neutral point is in the yellow region.

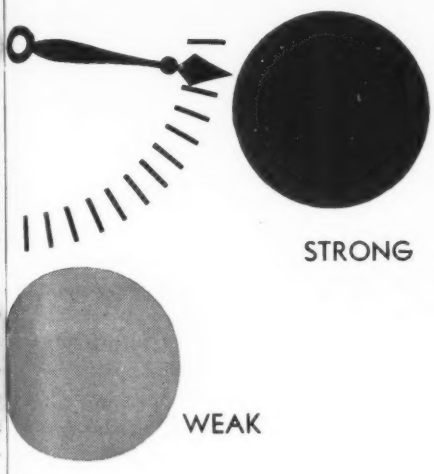
Factors which influence color clarity

Printing inks as well as paper stocks are of two main textures: (1) opaque and matt (2) transparent and smooth. Brillance of color generally is assured if the texture of the ink is like the texture of the stock. With dull-finish boards and papers, a dull-finish ink will appear richest. Where for purposes of protection a varnish is applied, the matt appearance will largely disappear and the colors will grow deeper and shinier. With finished papers and more shiny inks, clarity will increase. All colors will deepen if coated with varnish.

If some attention is paid to the above facts, the unkempt appearance of many containers may be overcome. Mottled, splotchy surfaces often result from the inks being only partially absorbed by a paper stock. If the inks are shiny and the stock dull, the result will naturally be poor. To assure a good, clean finish one of two things may be done: (1) on a dull, absorbent stock, specify inks that are also dull—the all-over effect will be consistent (2) if basic inks and stock match in texture, an all-over application of varnish will affect them uniformly. Again the effect will be consistent. However, if shiny inks are used on dull stocks, a varnish coating will emphasize the gloss of the ink, but do little to improve the stock, and the container may thus tend to appear shoddy. Shiny inks on finished and enameled stocks rarely cause trouble, with or without varnish.

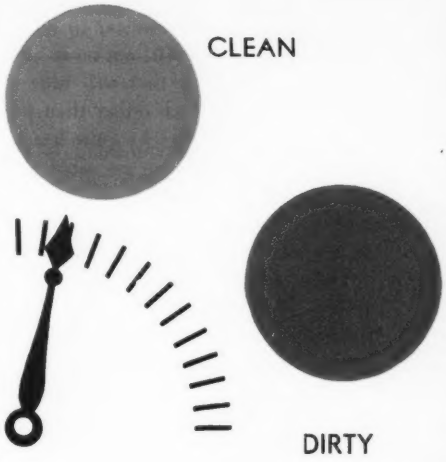
Good clarity of color is in constant demand, for such effects have the greatest human appeal. Ordinarily, clean, white stocks print best with transparent inks. Such inks

Color Appeal



Both of these blues came out of the same can. One was printed with correct makeready and a right impression of ink. The other was weakly printed. Under competition, these two colors would rank one hundred per cent and zero per cent, respectively, judged side by side.

One of these orange toners was printed with proper makeready on a clean press. The other was printed under smudgy conditions. Practically every human eye will have the same reaction to the two results—the one cheerful and one repellent.



Color Legibility

Legibility is an important factor in many types of printing. To solve the problem effectively scientific facts must be carefully weighed against human vision.

White on black also offers good contrast.

Legibility is an important factor in many types of printing. To solve the problem effectively scientific facts must be carefully weighed against human vision.

Where prolonged attention is given to the printed word, black on white is the best of all the color combinations.

Legibility is an important factor in many types of printing. To solve the problem effectively scientific facts must be carefully weighed against human vision.

Where reading conditions involve brilliant light, black on ivory or cream is desirable.

LOOK

Black on yellow is the most legible of all the possible color combinations.

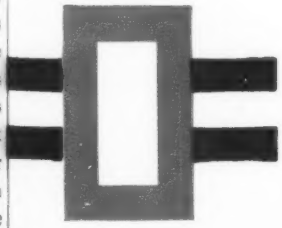
LOOK

Red on white ranks third in color attention value, and blue on white, fourth.

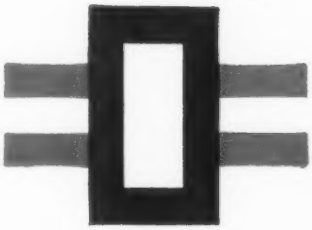
LOOK

White on blue ranks fifth, and black on white sixth in color legibility.

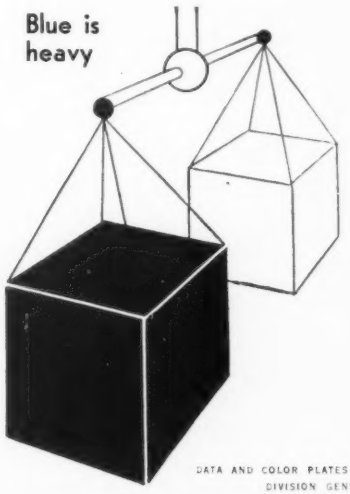
Color Appearance

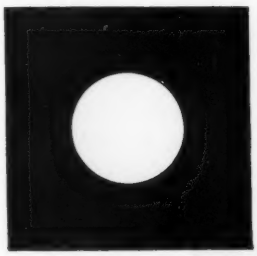


Red is near



Blue is heavy





Yellow is large



DATA AND COLOR PLATES COURTESY EAGLE PRINTING INK CO., DIVISION GENERAL PRINTING INK CORP.

reflect light from the surface of the stock through the ink film and, therefore, have a luminous beauty. On stocks that are grayer or yellower in tone, or thick in texture, the transparent ink will not be at its best. Here an opaque ink is desired—one that will hide the stock and reflect light from its surface rather than penetrate into it. Thus a transparent ink may be quite beautiful on coated stock, but grayish and dull on uncoated. Conversely, an opaque ink may glisten brightly on dull stock, but appear thick and dim on shiny stock unless it is formulated to dry with a high gloss similar to that of the board or paper.

There are three primary colors in printing ink: red, yellow, blue. Toners of these three hues, in various shades, will form most other colors either in actual mixture or in screen combinations.

Where one ink is printed over another or on a colored stock, the result will be good or bad depending on whether the colors are closely related or complementary. No printing ink is absolutely opaque. Therefore, complete coverage cannot be expected. The package designer should study the table on page 69 as a practical guide to color effects obtained, both on colored stocks and from overlapping inks.

Beauty of color in an ink implies not only proper choice from the spectrum, but also consideration of texture. A red ink, for example, may be specified as: (1) ordinary transparent (2) ordinary opaque (3) bronze red, with metallic top tone (4) dull-set, to have the appearance of a matte surface (5) high gloss (6) silversheen. In each case red will be seen, but its finish will differ. Each particular texture has its appropriate beauty. The dull-set ink, for example, lets the vehicle anchor into the stock, thus holding the pigments on the surface and reflecting light almost equally from all angles, without shine. The glossy ink, vehicle and all, dries on the surface into a hard, lustrous film which reflects light more like glass or a highly polished surface. The silversheen ink combines a colored toner with an aluminum powder and has a beautiful finish which changes in appearance when viewed from different angles.

Color effects on metals, plastics, glassine, flint and pyroxylin coated papers, foils, waxed papers, cotton bags, glass, cellophane, etc., generally require specially formulated inks. Since such colors are ordinarily designed to dry on the surface of the material a wide choice of textures is not possible.

Technical aspects of inks

One of the important problems in the printing of packages for foodstuffs, or other commodities with delicate odor or flavor, is that of off-odors caused by the printing ink. These odors or flavors are usually in the vehicles for the printing ink as a result of chemical reaction during drying. In printing packages of this sort, extreme care should be taken, because it is quite possible to compound inks so free from objectionable odor that they will not affect the product deleteriously. Recently, by a use of some of the newer synthetic materials, it has been possible to formulate inks that are entirely free from objectionable odor. For various reasons these inks are not adaptable to all cases but they should certainly be considered where odor or flavor is so important that one can afford to go to any lengths to preserve its quality.

Incidentally, it should be noted that ink is not the only offender in respect to odor and flavor. Other components of the package, such as paper, adhesives, closures—anything that in any way can come in contact with a perishable article—should be carefully checked.

In a few cases it may be desirable to add an odor to the ink, not to cover objectionable odors, but for some specific purpose. In general, this idea has not been particularly successful because of loss of the odoriferous principles by evaporation.

In the case of package inserts, the selection of printing ink is of the utmost importance. Here the inks must be not only free from any deleterious odor or flavor, but also unaffected in any way by the contents of the package. Neither are they permitted to contain any poisonous ingredients, if the contents of the package are to be used for food or in contact with the body in any way. Each particular package must be carefully studied. In general, inks must resist oil and moisture, and, occasionally, abrasive action. The essential oils used as perfumes and food flavors are particularly active solvents for ink vehicles. In some cases, such as dried cereals, there is a surprising amount of abrasive effect during shipping.

When cotton bags are used as containers it is a great advantage if the printing inks can be readily removed by washing. It is common practice, especially in the rural communities, to utilize the heavy bags which come in as containers for flour, animal feeds and other farm products, as a source of strong cotton cloth, particularly for dish towels, even as garments. Here it is essential that the printing ink be completely removed by ordinary washing. Such inks are readily available if specified.

Because many packages are designed specifically for their attractiveness in displays, and hence will be freely exposed to light in windows, on counters, presentations, and store shelves, the printing inks used on the packages must be sunfast. The package producer, therefore, must be sure that the printing inks which he has purchased are well chosen, so that his package will not look dull and dingy after exposure in the retail store window.

As it begins to play an increasingly important function in preserving its contents against gain or loss of moisture or flavoring and other unwelcome changes, the package becomes increasingly complex in production. It is essential, therefore, that printing inks be considered in terms of plant procedure. For instance, if the package is to be coated with a moistureproof lacquer, special care must be taken both with the inks and in the scheduling of work from printing press to lacquer machine, or the lacquers will not adhere properly to the printed areas. Likewise when ordinary coated or uncoated paper is replaced by plastic sheet materials, metallic foil, coated paper of unusual properties or lacquered paper, it will inevitably mean that the ink, too, must be changed to suit these new materials. Further, one frequently finds that it is impossible to use the same printing machinery, and hence the whole process of package fabrication is altered.

New developments in inks

by John Simonds

Inks for packaging are almost as old as packaging itself, but the demands of war and the use of substitute packages for civilian requirements combined with developments in improved inks have brought this phase of the packaging problem into the limelight in recent years. As in almost every other industry, shortages of certain of the ingredients of printing inks have necessitated some substitutions. Some types of intermediates, pigments, vehicles, drying oils and other raw materials have been difficult to obtain but the ink makers have met the challenge and have, in many cases, been able to develop even better inks from substitute raw materials.

With new developments in printing inks have come corresponding improvements in techniques and equipment for applying them, but package designers must still bear in mind that the satisfactory application of ink to his packages is dependent upon the correct formulation of inks for the job.

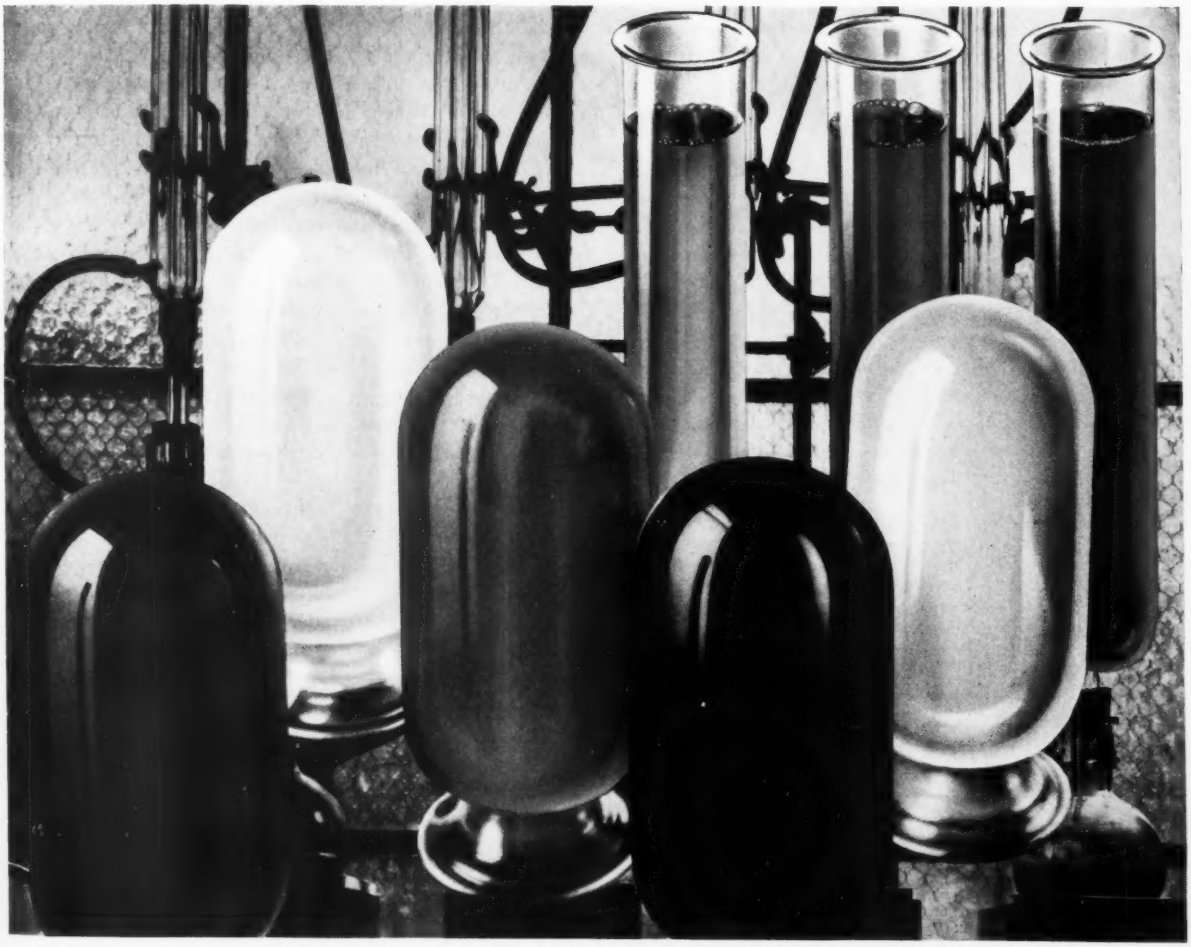
The following list of questions should be considered both by the package supplier and by the ink supplier before determining the type of ink which is the one best suited to a given job.

1. Will the package be exposed to sunlight?
2. Must it withstand heat? How much?
3. To what water or moisture conditions will it be subjected?
4. What kind of treatment will the package receive in use?
5. Will it need to be proof against special deteriorants, such as soaps, acids, alkalies, alcohol, oils, fats, perspiration, etc.?
6. What other special conditions should be taken into consideration?

In all cases the packager should furnish complete details on the requirements of his packages, thus enabling

1—For packaging, color is only one requirement of inks. Special formulations help packages to resist many hazards. Photo, Interchemical Corp.

1



the ink supplier to select the proper ink for the job—the one which will stand up in service.

Inks for packaging fall into a number of classifications which we will take up individually, with emphasis on new uses and developments.

Gravure inks—There has been an increasing volume of commercial gravure printing of packages, food and beverage labels, bags and wrappers. Gravure inks produce an effect which is like a continuous tone and they may be printed on paper, cellophane, carton stock, glassine, acetate, foil and many other materials. If the surface to be decorated is fairly smooth and bendable it can generally be printed by the gravure method. The invention of the closed fountain for gravure presses and the application of nitrocellulose and other synthetic lacquers has effectively stepped up production to speeds as high as 1400 feet per minute.

This type of gravure ink contains a volatile solvent which may be as high as 80 per cent of the whole but which constitutes no part of the final ink film. It is, therefore, recommended that solvent recovery systems be used whenever possible for greater printing economy. Gravure inks may be monochromes in dark greens, purples, blues and reds as well as various browns and black. They are also available as process inks employed for three and four color work.

Special gravure inks are used to give wood grain effects for boxes and wrappers. The rapidity with which gravure inks dry has made it possible to install printing units directly on packaging machines and to synchronize printing with slitting, rewinding, scoring, waxing and other operations.

The development of gravure inks is keyed quite closely to the development of equipment for using these inks. The next few years should show a continued improvement in both inks and machinery which will widen the applications of gravure printing for the packaging industry.

Moisture-set inks—These are inks which dry in the presence of water, steam, or other water vapor which may be introduced by several methods. These inks are used for many applications such as on chewing gum wraps, bread wraps and similar applications where an odorless ink is necessary. Three characteristics of these inks are important in food packaging:

1. *Drying speed*—They can be put through waxing machines within two hours after printing, compared with two days to two weeks for ordinary inks.
2. *Lack of odor*—There is no odor at time of printing nor does any odor develop subsequent to printing.
3. *Heat sealing*—These inks have 50 per cent greater sealing test than oil inks, permitting easier handling on the sealing machine and greater flexibility in design.

Moisture-set inks have particular advantages for printing corrugated carton liners. With ordinary inks there is a great loss of time and needless use of storage space involved in waiting for the liners to dry before they are printed. Moisture-set inks may be printed on green liners in which the presence of moisture will set the inks rapidly. This offers the possibility of carrying out a continuous operation from printing through instant drying and immediate scoring to the final fabricating and filling operations.

Aniline printing—Aniline inks were developed to meet the need for printing on webs and converting to other forms in one continuous operation. The principal advantages of aniline inks are simplicity of use, low cost, elimination of slip-sheeting, and adaptability to a wide variety of materials. Aniline inks will print on cellophane, foil and many of the new synthetic packaging products which are difficult or impossible to print by oil or letterpress inks. Another important feature is the long life of aniline printing plates, as many as 1,000,000 impressions being possible from a single rubber plate. Aniline printing is now widely used in the production of the following items:

Bread wraps	Milk containers
Foil bags and wraps	Cellophane bags and wraps
Gummed tape	Confectionery wraps
Glassine bags	Acetate wraps

Heat-drying inks—Two principal types of inks have been developed which dry almost instantaneously upon application of heat. The heat-drying letterpress inks are superior to ordinary inks in printing qualities due to their quick drying and retention of body throughout the press run. These inks dry quickly on the surface of the sheet, eliminating "dryback," offset and the need for slip-sheets. The other type is a heat-drying ink for offset printing. This ink may have a great effect on the increasing use of offset lithography on high-speed, web-fed presses.

Other developments—The Army, Navy and Marine services use various inks for many purposes. The strict requirements of these war uses have helped to improve the inks and make them of greater potential value to packagers. The principal applications for such inks in war service are for bag marking, identification of material, carton printing, stenciling, labeling of rations and personnel equipment. Packaged inks for general use are becoming more popular than ever. Such inks are available in 1-, 2- and 5-lb. containers in a variety of blacks and colors. They are easy to handle, dependable and of uniform quality.

Probably the most significant of the developments in the field of printing inks for packaging is not an ink, but a service. Although now severely restricted by problems of manpower and equipment shortages, this service will be invaluable to large producers of packaging in the postwar era. Originated by a major ink manufacturer, this service is known as a color standards survey. Through its use, a manufacturer may have part or all of his packaging requirements surveyed, a set of rigid color standards set up, inks formulated for each color on every type of stock which will be used and inks supplied to any printer in any part of the country which will produce the desired results. Such a color standards survey will cut down rejects caused by using inks not suited to a job and will save the time which was formerly lost in trial-and-error color matching.

Methods of reproducing designs

Different types of design lend themselves to different techniques in graphic arts; various materials respond to various processes; production requirements of a given nature may be better satisfied by one specific method than by another. In short the success of a package design depends as much upon translation by some graphic art as upon the original concept of the designer.

These facts have long been known. Thus reproduction methods and techniques have grown and developed to cope with the increasingly exacting demands of competitive package design—its wide range of color, illustration, typography and materials. Whatever restrictions or changes the war may have imposed upon package design and its reproduction, the designer may rest assured that there will be a suitable reproduction process at his disposal when he is ready for it. His problem may be one of recognizing and selecting the *most appropriate technique for his purposes*. Toward this end a thorough study should be made of the purpose of the design, the materials to be used, the quantity desired and the limitations of cost.

For the convenience of those concerned with the selection of reproduction techniques for package designs, the following five articles are offered covering the letterpress process, offset lithography, rotogravure, silk screen reproduction, and roll-leaf marking. Each of these contributions has been made by an authority in his respective line. A careful study of these articles should lead to an intelligent selection of a suitable technique for the translation of any package design.

The letterpress process of printing

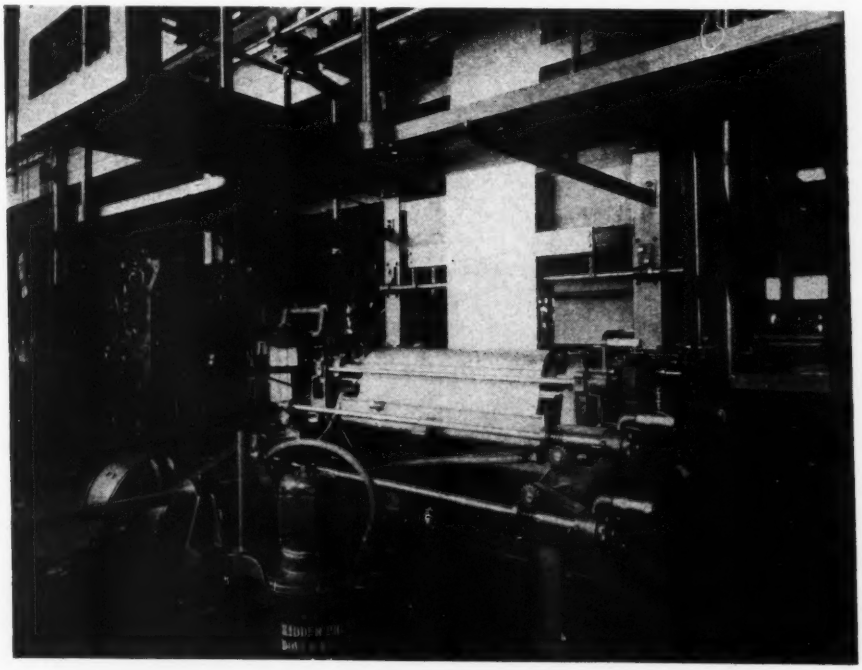
by Edward J. Peal

Letterpress printing as a process is one of the oldest methods of producing printed matter. It is the method which most job printers use. It is used for most of our newspapers, and in the packaging field, it is used on a very wide variety of subjects.

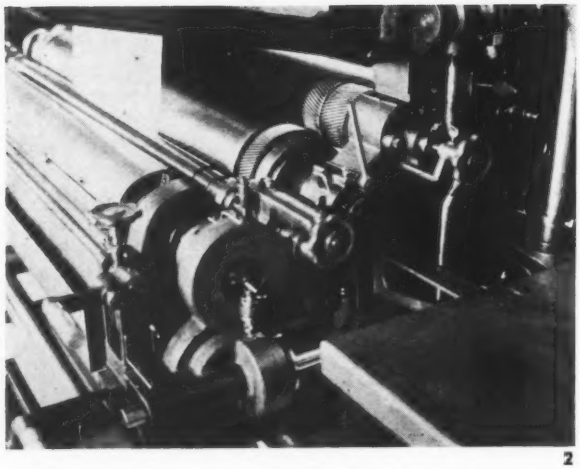
When Mr. Gutenberg, with infinite patience, carved out from a wooden block the first, rough letters by which he printed a copy of a hand written biblical manuscript, he used the letterpress process. When, at a little later date he dropped one of his wooden blocks and saw it shatter into several pieces on the floor he picked up the pieces and, putting them back together again, conceived the idea of carving the letters in separate blocks so that they could be used over and over again by rearranging them to print various texts. From that humble beginning has come the process which now prints the fine multicolor work with such realism that letterpress is considered one of the best methods of obtaining full color reproductions.

Simplicity of letterpress process

The process is very simple. Essentially it consists of the placing of ink on paper. In the original process the letters to be printed were arranged on a flat platen. They were then covered with ink by means of a dauber, the sheet of paper was placed over them, and pressure was applied to transfer the ink from the raised portion of the letters



1—View of the platform of a letterpress for aniline inks shows pump in operation. Fountain is totally enclosed. Photo, Kidder Press Co., Inc.



2

2—*The modern letterpress is quite unlike Gutenberg's crude equipment. Illustration shows close-up of the printing unit of a Kidder Anilliner.*

to the sheet. This, apparently, is where the word "press" comes from as applied to this process. As time went on, instead of setting up letters, the material to be printed was made in the form of a flat plate and it was on the raised portions that the ink was deposited which was later transferred to the sheet.

Variety of presses

At the present time, there are many kinds of presses used in the letterpress process. We have the flatbed press in which the plates or type are perfectly flat and are inked by passing them under a series of rollers. The printing is accomplished by passing the plates under an impression cylinder which carries the sheet or web of paper down against the plate. This type of press is very well known in the carton industry. It is suitable for printing in one or two colors, and it can produce very fine results.

Another kind of press is the completely rotary type in which the plates are curved and are clamped onto cylinders. The cylinders rotate past a series of rollers which apply ink to the surface of the plates after which they rotate against an impression cylinder. The web or sheet of paper is passed between the impression and the plate cylinders and thus receives the ink. Presses of this type may handle paper from rolls and are known as web rotaries; or they may handle paper in the form of sheets in which case they are sometimes called sheet rotaries. Sometimes these presses take paper from the roll, cut it into sheet, and then operate like sheet-fed presses and deliver the printed matter in sheet form. Such presses have been built to accommodate several colors at a time and there are a number of them operating today with as many as six colors being applied to the sheet in one pass through the press.

The web rotary press referred to above is the one most commonly used in the production of newspapers. The web-to-sheet rotary press is used in the production of food wrappers such as parchment and wrappers for various types of biscuit cartons.

Another variation of this process is the one referred to as aniline. Aniline really denotes a type of ink which is a liquid—and the printing process is, in reality, letterpress. The plates in this case are rubber or some soft plastic material which can be readily wrapped around a cylinder and fastened in place by a sticky material. The fountain for use with aniline ink is a simple device having only two rollers, as a general rule, and a pan for the purpose of containing the ink.

Development of letterpress accessories

It might be well here to tell something of the developments of the accessories to the letterpress. We have stated above that the original plate was made of wood. The original, individual type matter was made of wood also. But it was not many years before molds were made and separate types were being cast out of something resembling our present type metal material. In the job printer's plant, we see cases of letters arranged for easy assembly into words and paragraphs. Where a great deal of printing is to be done on a job, it has been found advantageous to make what we call an electrotype or a stereotype. This is the assembly of all the types into one solid, relatively thin plate.

To produce an electrotype or stereotype from type matter, we must first assemble the type as if we were going to print the job and then make an impression of this type either in wax for the electrotype or in a paper-like matrix for stereotype. In the case of the electrotype, the impression of wax is dusted with graphite to make it an electrical conductor and then the image is plated with copper. Later, the copper is backed up with type metal and this gives us a copper-faced plate bearing the exact same image as the original text. In the case of the stereotype, hot metal is poured into the matrix. Plates so made may be used flat or else they may be curved and employed on cylinders.

To make a rubber plate, we follow the same process of setting up the type matter and this is impressed into a plastic material and baked. Then this matrix is in turn put into the press and unvulcanized rubber is placed over it, pressure is applied, and a cooking process takes place which results in a rubber plate having the same letter formations as the original type matter.

A word about ink

When we read some of the formulas for ink which were used in the early days of printing, we wonder how they ever got their printing to dry. As a matter of fact, until quite recently drying was a very big problem in the handling of letterpress printed material. However, several types of ink have been developed which either dry at once or dry very rapidly—generally with the use of drying apparatus. With one ink formula, the printed sheet or web is passed under a series of gas burners so that the solvent is literally burned out of the ink. Another formula requires the printed web to be passed over hot drums and the solvent evaporated. Still another formula, which is used to considerable extent in the wax paper industry, is one which dries upon contact either with steam or with moisture-vapor.

Conclusions

There are those engaged in the design of printing presses who state that nothing really new has been applied to the letterpress process since the very early days. Maybe that is so, but there certainly have been improvements. One of the main improvements is in the question of accuracy. It is now possible to purchase plates of such uniform thickness and to apply them to machines of such extreme accuracy as to print with practically no make-ready and get perfect work. To develop such accuracy has taken the combined brains and hard work of all of those engaged in the production of plates and the manufacture of machines over a period of many decades—most of it during the last century. Other processes rival the letterpress; but for ability to produce definite results and to keep on producing year after year, the letterpress is still the most important printing process in common use at the present time.

Offset lithography method

by Louis R. Beck

Offset lithography is one of the three basic methods of printing. It is planographic, printing from a plane surface—neither raised nor indented. The printing surface and the non-printing surface are on the same plane. The plate is prepared by chemical treatment—a treatment which makes the plate attract and hold moisture over the non-printing areas and attract and hold the grease ink over the printing areas, when the plate is dampened. Because water and grease will not mix, the image on the plate repels water and attracts ink. Consequently, the printing area—and only this area—retains ink and transfers the image. The lithographic principles may be summed up in the statement that grease and water will not mix. Offset lithography employs this principle and transfers the image—positive on the plate—to a rubber blanket and thence to paper. Offset lithography differs from direct lithography which is a direct transfer from plate to paper, using no intermediary rubber blanket in the fact that the offset image transfer to paper is made through the medium of a rubber blanket.

Since offset is largely a photographic process, it is essentially true that anything that can be photographed can be reproduced by offset. The value of this process is obvious. Its advantages include high speed, economy and a variety of copy material which may be effectively reproduced by this method.

Offset lithography is produced on rotary presses. Because a single plate carries all of the image for each color to be reproduced and the image is transferred to a rubber blanket, which prints it on paper, make-ready time is reduced to a minimum.

Practical printing process for packaging

Offset lithography has been used for years to print cartons. Its use in this field is not new and a large volume of high class carton work is being produced by lithography today. This method of printing was receiving increased acceptance from carton producers and users previous to the war. The growth of offset lithography in the carton industry will undoubtedly be continued to a greater extent when conditions permit.

It must be remembered that the results obtainable from any printing method or equipment are, to a great extent, determined by factors beyond the control of either the manufacturer of the printing press or the press operator. Important among these factors are the considerations of paper and ink. In recent years, both the quality and uniformity of carton stocks has improved and these factors have contributed greatly to the betterment of the finished printed product.

Stocks up to .035 in thickness are being printed by lithography and nearly every type of board can be run. Properly made lithographic plates have run to as high as 250,000 impressions. Offset lithography is a versatile printing method for carton production. The limitations on offset lithography for packaging or carton printing are the same as those of any rotary printing method in comparison to other printing methods.

The equipment

Offset lithographic presses are built in a complete range of sizes and in single and multicolor models. There are practically no limitations on the use of offset lithography for carton work as far as press equipment is concerned.

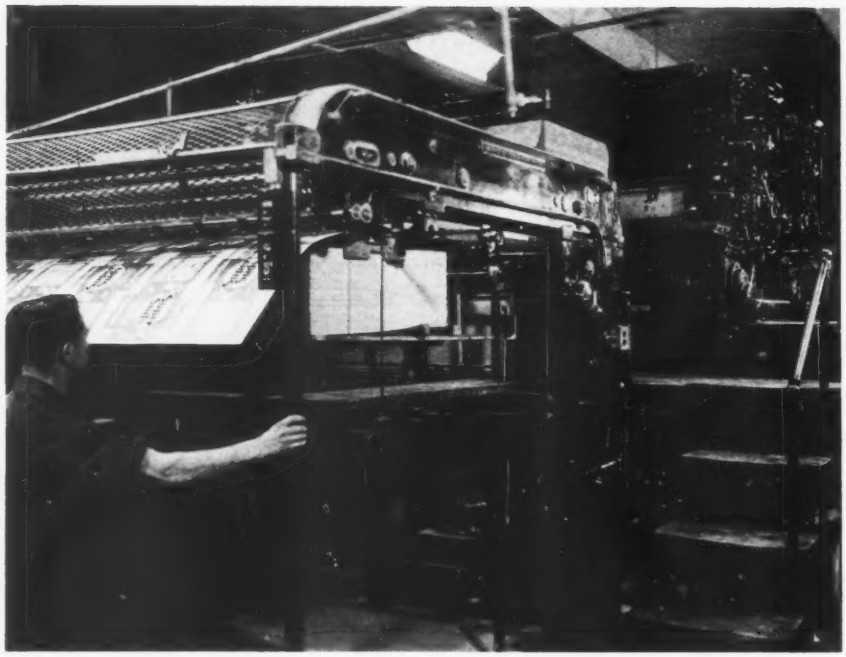
Advantages

Many advantages of the offset method over other processes apply in package printing as well as in other

3—Production of multicolored package wraps for modern merchandising demands quality equipment and craftsmanship. Photo, Kidder Press Co., Inc.

3





4

4—Carton board stock of many different types, up to .035 gauge, may be run by means of offset lithography. Here carton sheets in several colors are produced by rotary offset press in Chicago plant of Ace Carton Corp. Photo, Harris-Seybold-Potter Co.

types of printing. Offset printing is fast because it is rotary printing.

The speed and the economy of offset printing is an important consideration for the carton industry. The costs of both original and duplicate plates necessary for running more than one up is another point. The ability of lithography to print on an extensive variety of stocks, particularly the reproduction of halftones on coarse surfaces, is important. The distribution of ink over flat color areas obtainable by offset is an added advantage of lithography over other processes.

Offset lithography is practical for short runs; it is the only rotary printing method which is successfully adaptable to short runs.

In some respects it is fair to state that it is the most adaptable of all printing methods to short run work. For example, if a short run job must be run several up, the cost of duplicate plates and the number of impressions per hour would be important factors affecting the decision on the printing method that would produce the most economical results.

Users and producers of packaging material who have not used offset lithography and who are interested in its possibilities should make thorough investigations of this method of reproduction. Lithography possesses characteristics which are undoubtedly of true value to people concerned with packaging.

Rotogravure for package printing

by G. N. Auerbacher

Rotogravure is an intaglio printing process in which the design to be reproduced is etched below the surface of the printing cylinder. This is contrasted to letterpress where the raised portion of the plate contains the design, and to lithography where the printing plate is essentially a plane with the non-image areas made and kept definitely ink repellent.

The design, in gravure, is etched directly into the cylinder, and not into a separate detachable plate. This etch consists of minute cups or recesses which serve as vehicles to carry the ink to the stock. The walls that surround each cup are formed by screening before the design is etched into the cylinder.

The gravure cylinder may be inked by revolving under an ink jet, or in an ink pan at the base of the cylinder. Either method not only fills the etch but also leaves an ink film on the surface. This film is removed by an oscillating doctor blade pressing against the revolving cylinder. The walls surrounding the cups prevent this blade from wiping ink out of the etched design. A roller forces the moving web against the gravure cylinder, transferring the ink from the etched design onto the stock. The web is fed from a roll through the printing units, and then it is either rewound or it may be passed into fabricating units.

Great production capacity

Dry print—The greater productive capacity of rotogravure printing is gained by the dry print of gravure inks which eliminate drying time between operations. Six colors are printed as rapidly as one color. A rotogravure press can apply gloss inks, lacquer, or wax, and feed the web into mechanical devices for slitting, perforating scoring, die cutting, or sheeting. Printing and fabricating are performed in a single continuous operation.

Only with instant-drying inks is it possible to print any number of colors, one on top of another, and fabricate or rewind the printed result without offset. In rotogravure such fast drying inks can be successfully ap-

plied. Not only a saving of time, but also a saving in handling is obtained by this process which prints without interruption from a roll of plain stock to the finished result, delivered in the desired form.

Simplicity of operation—As excellent printing is a fine art, it can never be made to be completely automatic. Rotogravure is no exception. There are certain features of rotogravure printing, however, which minimize the number of adjustments necessary to ensure splendid results. As a finished gravure job is produced with a single pass of the stock through the press, such conditions as tension, temperature, and humidity are the same for all operations. This eliminates many of the difficulties of register control encountered when time must elapse for ink drying between printing the various colors and fabricating the printed result.

Rotogravure is simplified still further by the elimination of make-ready. Printing starts as soon as the cylinder is in place and the pressure of the doctor blade and impression roller is regulated. There are no ink rollers to be adjusted. The proper supply of ink is automatic. The dry print makes tympan rolls, slip-sheeting and sprays unnecessary.

Press flexibility—Printing cylinders are not limited to a certain fixed circumference, but instead are free to vary within a wide range between the minimum and maximum size. This provides for the economical production of different sizes of work on a single rotogravure press. A large design might be repeated only twice around the cylinder, a smaller design five times around. In each case, the circumference need be just great enough to contain the design without a break or gap causing a waste of stock. Although the maximum printing width for each press is determined by its web size, narrower webs may be used to eliminate waste stock at the sides, should a design not require the full width.

Advantages of enclosed ink fountain

The speed-dry enclosed ink fountain, a patented feature of all Champlain rotogravure presses, permits a completely new conception of ink application. The supply of ink, held in a closed reservoir, is pumped to the cylinder, where it is fed through a slotted nozzle sealed against the cylinder surface. The oscillating doctor blade removes the excess ink from the surface areas, which are not intended to print, leaving the proper amount of ink in the recesses of the cylinder. All surplus ink is guided by the splash guards to the bottom of the fountain chamber, where it is screened before returning to the reservoir.

The ink remaining in the etched design is transferred to the paper under the impression roller which forces the moving web against the etched cylinder. This lifts the ink from the design onto the stock to be printed. As the ink dries almost immediately, the web may next be passed through other printing units, or directly into mechanical devices to fabricate the printed result.

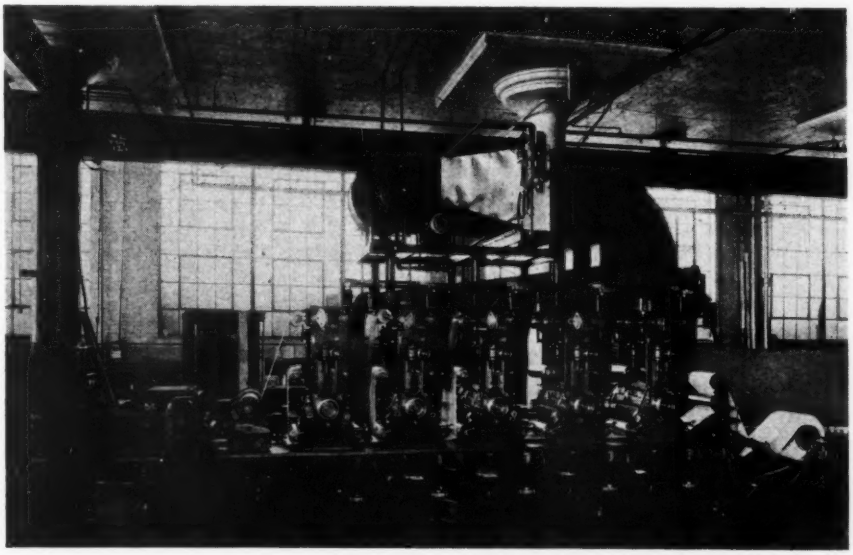
Importance of enclosure—The sealing strips on the ink applicator, the doctor blade, and the end shields which cover the space at the ends of the cylinder, effectively enclose the ink chamber, making an entirely air-tight fountain. Inks containing highly volatile solvents are used without handicapping operation or damaging the printed result. Continual addition of new solvent to keep the ink uniform is eliminated. A saving in the amount of the solvents consumed is obtained.

An improvement in color register is found, as fast-drying inks permit shorter web leads between printing units. High temperatures for rapid drying which cause distortions in the web are not necessary. Shorter web leads and lower temperature drying result in a more compact press, an improved quality of multicolor printing, and savings in waste stock.

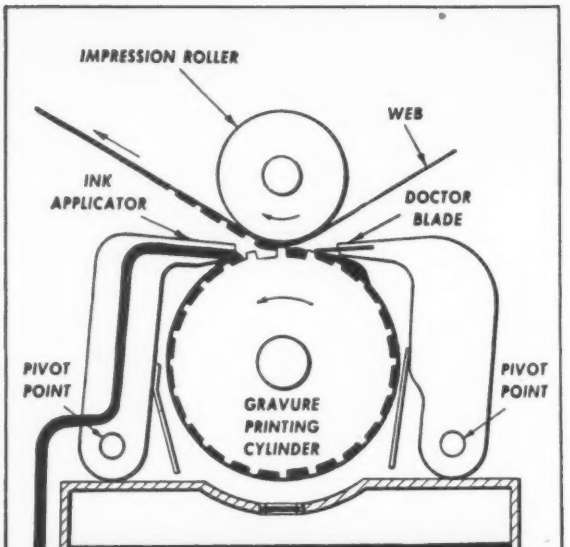
Drying of residual ink in the etched cells is inhibited by continually flushing the engraving with fresh ink from the applicator. The continual circulation of the ink prevents the settling of pigments and maintains a constant consistency throughout the entire run. Splashing of ink on the web is prevented by this enclosure which also serves to keep foreign particles from the ink.

The ink applicator and the doctor blade swing out of

5



5—Broadside view of 5-color gravure press showing rotary sheeter and delivery for labels, wrappers, etc. Photo, Champlain Div., Fred Goat Co.



SCHEMATIC DRAWING — ENCLOSED INK FOUNTAIN

6

6—The dry print of gravure inks saves time. Diagram shows the enclosed ink fountain of a gravure press. Photo, Champlain Div., Fred Goat Co.

position, thus making the chamber readily accessible for cleaning when color changes are required. This pivot action gives the flexibility in the circumference of the printing cylinder and allows economical production of work widely varying in size on a single press.

Rotogravure quality

Control of ink volume—The inherent characteristic of gravure, in carrying the ink in a subsurface design, is an important factor in the superiority of its printing, as it provides the opportunity of controlling the volume of ink carried to any given portion of a design. The etch consists of minute cups or recesses which vary in depth as the tone which they are to print. The deepest cups will naturally carry the greatest amount of ink. By this is achieved the wide range of tonal expression from the richest depths to the purest highlight. The intermediate tones may be produced from as many as fifteen different depths of etch, all from the same printing cylinder.

The finer screen, normally 150-line, which is used in rotogravure, eliminates the screen effect in the printed result. This is aided by the blending of the ink from one cup with that from an adjoining cup after it has been deposited on the stock. This blending yields an excellent solid coverage of ink, of either the transparent or the opaque type, when printing is produced from a deep etched cylinder.

In this case, tone work, solid colors, lines and fine type may be combined on the same cylinder and printed with equally splendid results. Each receives ink to the full depth of its etch.

Uniformity of color—The important consideration of quality printing, color uniformity, is accurately maintained throughout an entire run by rotogravure inks sealed in the enclosed ink fountain. Variation of ink consistency, caused by solvent evaporation, not only produces changes in the printed result, but also in the speed of drying.

Both of these difficulties mentioned have been solved so well by the enclosed fountain, that inks may remain in the fountain reservoir and used the next day without running the risk of a noticeable change, which might impair the final effect.

Range of application—The wide variety of stocks which can be printed by rotogravure include papers such as label, coated, super, news, manila, English finish, tissue and kraft; paperboards such as spruce sulfite, chip clay and patent coated; and miscellaneous stocks such as flint glazed, foil, cellulose acetate, cellophane, glassine and other similar materials.

The advantage of gravure inks lies not only in their greater speed drying, but also in the ability of the process to handle the "difficult" inks. Metallic, gloss, and varnish inks, all commonly required for package printing, are printed in the standard rotogravure unit with the same simplicity of operation as for the normal inks.

From the above discussion the various advantages offered by the rotogravure printing process of reproduction should be apparent.

Silk screen for packages

by Eugene Morley

Until recently, the silk-screen process has been known chiefly in poster and display fields, but it is rapidly coming to the fore as a means of decorating packages by imprinting directly on the surface. It is especially valuable in the cosmetics field where the appearance of the package and its counter appeal affect its sale so directly. Its use is increasing in this field for that reason, but it is also being used to a greater extent in some other fields where its practical aspect rather than its appearance is the factor. Many milk and soft drink bottles intended for re-use, as well as at least one top whiskey bottle, are decorated or marked by the process and fired at glass-melting temperatures to form permanent imprints, thus eliminating a new labeling operation at each filling.

Since silk screen is a stencil rather than a printing process, it is often successful in combating problems well beyond the scope of true printing—letter press, planographic or intaglio. Because its machinery is not as advanced as that of the true printing processes, it has some disadvantages which limit the number of its uses—mainly the disadvantage of greater cost.

Development of silk-screen process

As a process, it has a short but interesting history. Its development is entirely American, and the earliest use

that has come to the attention of any writer on the subject is in the printing of felt pennants in 1910 or 1911. The substance of the felt offered a difficult fibrous surface which received too little ink in other printing methods but accepted the heavy silk-screen deposit readily. By the late Twenties, its use became nation-wide as a medium for printing posters and display cards in runs too short to be practical in another printing method and too long to be practical in hand painting. Its means during most of this period were crude, and its uses were often limited to circumstances where its only advantage was low cost in short runs. The late Twenties and early Thirties saw some technical advances which mightily increased the scope of the medium and revealed the prospect of new possibilities.

Applications of silk-screen process

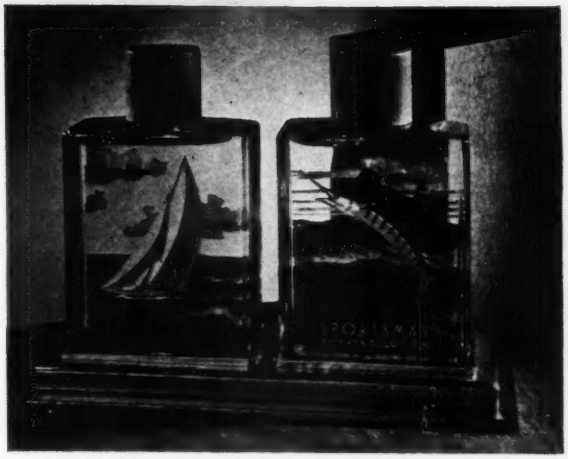
The silk-screen process is used at present in industries which must seem queerly unrelated unless one understands the nature of the medium technically. Among those fields are poster and display as before, and ceramics, textiles, wallpaper, instrument dials, toys and novelties, packaging, plastics, book illustration and—most unbelievably—the Fine Arts. In the last-named field it is used both as a reproduction medium for some of the world's finest paintings and as an artist's original medium similar to lithography and etching.

Technique and results

Silk-screen technique is at once simple and complex. Its rudiments can be mastered in an hour yet a fine result can be achieved only by a master technician, and these are few since they have gained their experienc only during the past twenty years or so. The principle involved differs basically from that employed in the true printing processes since the stencil principle is called upon. Silk screen is stenciling quite as truly as is the act of a shipping clerk who stencils a destination on a packing box with the use of cut-out brass letters and a heavy ink-filled brush; it differs only to the extent to which refinements have been introduced.

In the packing case stencil, the chief limitation is that the stencil will not hold together unless certain bridges occur in each letter to hold isolated centers in place. This is eliminated in the silk-screen process by using a stencil material more pliable than brass (usually lacquer or gelatin) and adhering it firmly to a tightly stretched mesh of silk or of metal. The printing material—which may be lacquer enamel, ceramic or almost anything mixed with a suitable adhesive—is not now applied by means of a brush, but is, instead, forced by the action of a rubber squeegee through the mesh of the silk and through the stencil to the printing surface beneath.

The deposit thus made is controllable in every respect. It may be thick enough to produce the dots of Braille type or it may be infinitesimally thin; it may be matte or gloss, opaque or transparent; and it may be any color whatsoever that is available as a pigment. Since the imprint made is a deposit rather than a "kiss" imprint, it is applicable to almost any surface firm enough to hold together. Each additional color requires a separate printing operation—no means as yet is available for applying several colors in one operation—but where the appearance of a package warrants a somewhat higher printing cost, as many colors as necessary may be applied in perfect register without any limitations as to the complexity of the design or the size of the lettering. In the case of one widely advertised package, nine colors were applied to the front and back of a stock bottle to form a three-dimensional effect which has set this package high among its competitors in this field.



7



8

7—High in eye appeal, silk screen adds freshness to many types of packages. Photo, John Hudson Moore, Inc. 8—Special silk-screen printing materials form a permanent bond with plastics and give individuality to containers using stock molds. Photo, Creative Printmakers Group.

Effect of wartime restrictions

Wartime restrictions and the resulting tendency to use more and more stock molds in plastics as well as in glass, have emphasized the value of decorating directly on the package. By this means, where several products or a similar product made by several manufacturers are apt to appear on the market in identical containers, it is very important that each achieve an appearance which is completely distinctive.

This problem is chiefly apparent in the case of plastic lipstick containers. A few shapes and sizes must now serve the packaging needs of many manufacturers. Most of them are now decorated by silk screening the maker's imprint or design directly on the plastic service. A



9

9—Roll-leaf embossing, tastefully applied, lends distinction to candy box covered in velours paper. Photo, Peerless Roll Leaf Co., Inc.

thoughtful use of color and design distinguishes one lipstick from another easily even though the silhouettes be identical. Most plastics now in use cannot be permanently imprinted in lacquer or enamel, the more familiar silk-screen materials, but the adaptability of this process permits the use of printing materials especially designed to form a permanent bond with the plastic surface.

The war has made its demands upon the silk-screen industry as it has upon all others. Again special printing materials have had to be developed for imprinting containers for medicines and drugs in such fashion that the imprints would withstand successfully the conditions met in wartime uses. The most remarkable wartime use to which the process has been put is the imprinting of luminescent instrument dials for aircraft, submarines and other machines of war. The luminescent material was formerly applied by hand since its consistency made it impossible to apply by an imprinting process. Silk screen was able to solve the problem of calibrating these dials in production quantities, but only after a hard struggle—tolerance requirements of ± 0.005 in. were not met until many trials were made and new equipment and methods had been devised.

Roll-leaf marking and embossing

by Alfred A. Morse

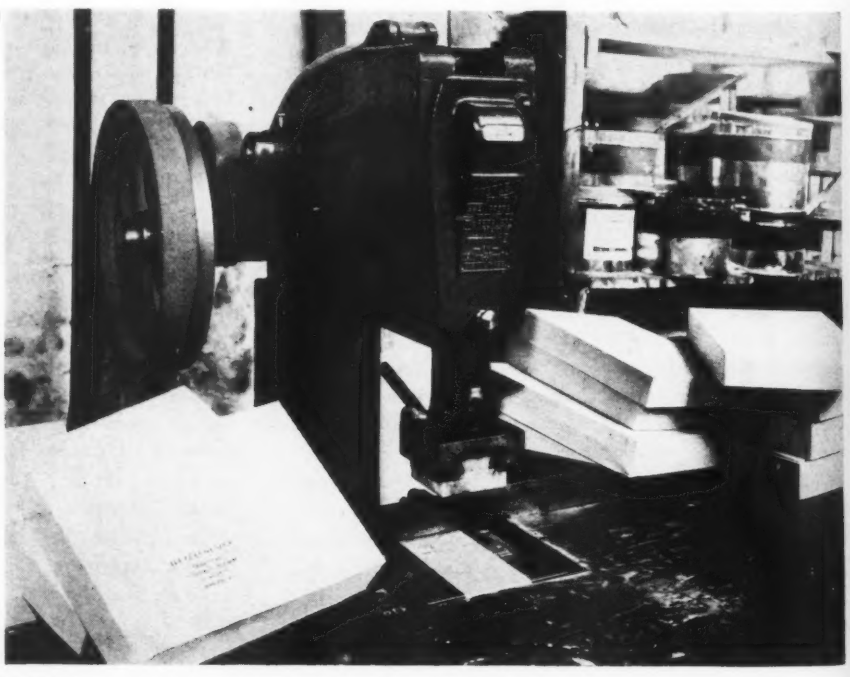
The roll-leaf marking and embossing process is a combination of engraving and printing methods. Lettering and designs are engraved or stamped into the surface of the material at the same time the dry pigment color or bronze foil is transferred from a web of glassine or cellophane. Materials which lend themselves to marking with this method include: paper, board, cloth, fabric, leather, wood, fibre, hard rubber, plastics, etc. Under some conditions, it is possible to use this process for marking metal surfaces carrying a heavy enamel or lacquer coating.

Requirements

In order to accomplish roll-leaf hot stamping and embossing, three things are required: a stamping press, a roll of stamping foil and a brass or steel die, or type. Presses used can be classified as: (a) platen presses such as Chandler and Price, Brandtjen and Kluge, and Colt's Armory presses; (b) bookbinders' presses of the Sheridan and Seybold type; (c) specially designed upright presses such as the Peerless. The Peerless press has been specially designed for roll-leaf hot stamping and is available in rotary models as well as in the upright models more generally used. Presses can be designed for hand operation, semi-automatic or fully automatic operation.

Very little make-ready is required for ordinary flat stamping such as for lettering or open trademark designs. Where embossing is required, make-ready is cut on

10



10—Roll-leaf presses, available in a variety of hand-operated and automatic models, serve many packaging purposes. This inverted roll-leaf press is at the New York Folding Box Co. Photo, Peerless Roll Leaf Co., Inc.

the bed of the press. A roll of stamping foil of the required width feeds across the face of a heated die attached to an electric heating plate.

Since dry colors are used exclusively, no drying time is necessary. The stamped articles can be packed immediately or used in subsequent manufacturing operations.

Range

The roll leaf comes in several shades of genuine gold, imitation gold and silver, and a wide range of colors. Two or more colors can be used at one time if they do not interfere with each other in the design. Roll leaf is available in widths up to 24 inches in $\frac{1}{8}$-inch units. Roll leaf is usually supplied in rolls 200 feet long but can be had in special lengths if desired. Thousands of impressions can be obtained from the relatively inexpensive steel or brass dies or type.

Applications

Because of the varied characteristics of different plastics, marking or decorating such articles with roll leaf is sometimes difficult. Special presses have been developed for marking plastics, presses to operate under high pressure using steel dies. Articles of wood, on the other hand, offer no difficulty, whether the surface is flat or curved.

Another application is the imprinting of cartons. Ordinarily, quantities required must be estimated in advance and large stocks of folded and pasted blanks must be carried at all times by the manufacturer. By the roll-leaf hot stamping process, this is all avoided. The manufacturer buys only one type of blank in each size. As special imprinting is needed, a supply of the folded and pasted blanks is placed in the hopper on a carton-imprinting press, stamped automatically and ejected. Since no time is required for drying, the stamped blanks can be used immediately in packaging operations.



11

11—*Plastic surfaces, both flat and curved, may be precision marked by means of roll-leaf hot stamping. Photo, Peerless Roll Leaf Co., Inc.*

Stamping box tops and wraps

In stamping box tops and wraps, the printing is first done on a platen press and the printed blanks are then fed into a press equipped with a roll-leaf feeding attachment and heating plate.

Roll-leaf attachments of this kind are available for platen presses of the Chandler and Price or Brandtjen and Kluge types.

It is also necessary to employ a brass die for the part which is intended to be embossed with roll leaf. The purpose of this die is not only to release the foil but also to emboss the surface of the cover stock. The die is designed in such a way that it will serve both of these purposes in the same press operation, thus contributing toward production efficiency.



12

12—*Trademarking plastic lipstick cases by hot stamping on automatic, self-ejecting press. Operator applies cases to the rotating dial. Speed is limited only by ability of operator. Photo, Peerless Roll Leaf Co., Inc.*

The artistic element

by Josephine von Miklos

There are many indications that package design has, at last, graduated. Its motives, and even the essence of its conception, are no longer dictated by considerations of merchandising alone. Package design today no longer means putting a few fancy doo-dabs on a paper box, or a pink bow around the neck of a bottle. It has, rather, become a full-fledged member of that family of fine and applied arts which is attempting to introduce into every aspect of modern living an element of aesthetic balance—a state of mind, perhaps, which accepts beauty as a prime essential of acceptable design.

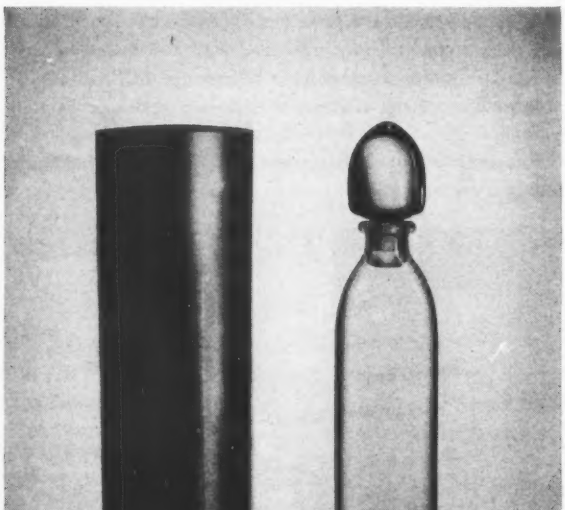
Time was when beauty in packaging, an academic evaluation of design principles as such, sounded rather high-brow to the average manufacturer, to the average consumer. Protection, economy, practicability, and, perhaps most of all, advertising value, used to be the problems which were attacked first. And it is perfectly true that whether we think of foods, cosmetics, or hats, a container has to be appropriate and it has to work. It has to put a message across.

However, we have advanced—it is no longer true that all these factors need eliminate beauty, or even that they come, necessarily, first. I might venture to say that if a package solves all of these problems to perfection, it also, almost automatically, has beauty. Or, if we want to look at it the other way around, we will find time and again that if a package is basically well designed, if it is beautiful, it will also have all those other values which make it commercially acceptable and therefore a completely successful package from the producer's point of view.

Perhaps we can think of all this in terms like these—a completely unromantic thing as, for instance, a plug gauge, machined and hardened and ground and lapped to a tolerance of no more than plus or minus a ten-thousandth. It is perfect for its own intents and purposes; it is completely self-contained. There is no argument about it and no variation of taste—no emotional quirks can lift it to a higher level or pull it down to a lower degree of acceptance. There it is, and it is right, and so it is also beautiful.

By the same token a package, any kind of a package, whose color scheme is in accordance or harmony with the surroundings in which it is to serve, whose shape complies with its contents, whose mechanism performs with the destined use of the merchandise and which conveys an intended message to the consumer, is right and is also beautiful.

1



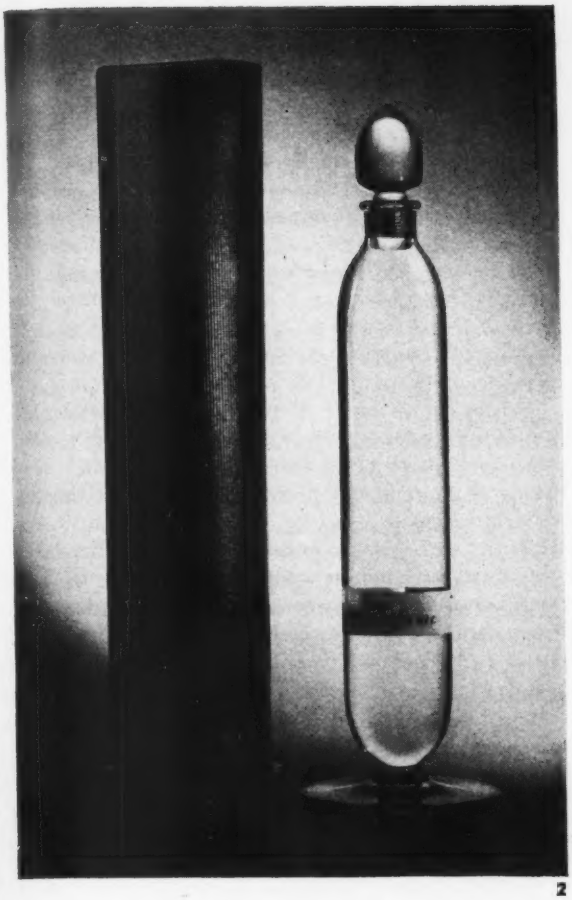
"Anthing sells in wartime"

If we see, today, some unlovely packages in wartime substitute materials or with a lesser degree of workability, it isn't because substitute materials or physical imperfection and beauty are necessarily and of themselves, mutually exclusive. It is, rather, perhaps because the people who made them up were more intent on other, and probably more important things in terms of the war, than balance, and color, and design. It is, perhaps, because the idea that "anything sells in wartime" has made us a bit careless.

It may be that since a number of processes are not available, we didn't think fast enough to turn around and use or even invent other processes. And yet, there are even wartime packages which succeeded in being beautiful in spite of hurry, scarcity and lessened quality of material and workmanship.

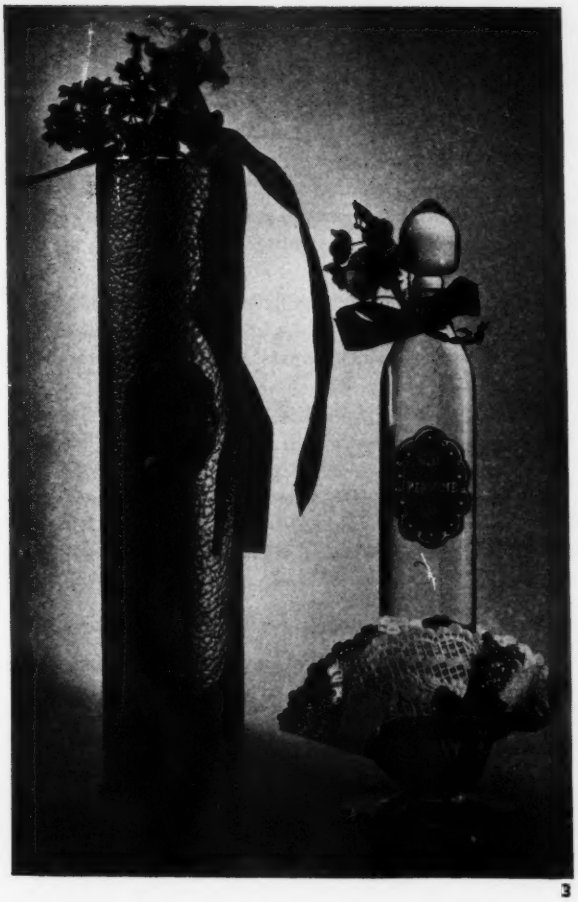
In other words, as in the case of the plug gauge, any

1—Basic, unadorned beauty is demonstrated by this bottle and case selected for handsomeness of sheer line, effects which may be enhanced or ruined completely by the decoration chosen to adorn them. The glass bottle, all shape, is suitable for a rare perfume. It may be handmade, or it may comprise a plastic base glued to the bottom of a glass tube. The cylindrical container is of aluminum. Though light metals may not seriously hamper the use of cardboard for such packages, light weight and rigidity are advantages. Same containers, elaborated, are on p. 85.



2

2—Decoration, cleverly applied, enhances the basic beauty of the containers illustrated in Fig. 1. On the bottle, nothing has been used save a simple white label which has identification as its sole purpose and permits the color of the perfume to speak for itself. Texture has been added to the aluminum tube by a knurling pattern machined on the entire surface. This decoration is both beautiful and functional—it catches the light, adds a feeling of "grippability" and does not show scratches.



3

3—Using the same set of basic containers, all beauty may be concealed by tasteless decoration in the shape of chichi and frills which serve no purpose and spoil the line and the feeling of the material. Following a common trend of making a substance look like something else, the metal tube now appears to be leather, and it has lost all of its character. Everything possible has been done to spoil the looks of the bottle with a lace skirt to hide the base and flowers to detract from the fine stopper.

package can be beautiful at any time and we do not have to wait for abundance to create beauty. Or, we could put it this way: there is no earthly excuse for a package being ugly under any circumstances. If we only take a package just as seriously as we take a building or a picture; if we only apply to it those principles of design which have been established in other fields of artistic endeavors, we will not, and we cannot fail to create a real beauty in package design.

Abstract beauty is not enough

Of course, we do not intend to maintain that beauty is related only to purpose and function. Second, in the complicated and diversified setup of present civilization, criss-crossed by and intermingled with so many economic, emotional and social trends, beauty alone, beauty in and of itself, is, of course, not quite enough. Or, to qualify this somewhat further: abstract beauty, theory of design, are not enough.

There may not be a direct and practical purpose in a work of art, unless we want to consider the joy and the spiritual inspiration art gives us as having direct and practical purpose, which in a transcendent sense, it does, of course, have. Such purpose, however, is not in the usual, commercial sense, salable.

We who deal in mass production and widely varied consumer goods, have long ago realized that there is another element, based on human variations, on the more pedestrian factors in the realm of aesthetics, on the whimsical changes of taste, even on the most personal of personal factors in expression—decoration.

We might look at decoration very much as the language which expressed in audible forms all those more or less intangible terms which make a package, or, for that matter, a house, a public building, a dress, the humanly understandable thing it is, or ought to be, if we are really to like and to enjoy it.

Now, it is true, we have to do without decoration in

many of our wartime packages. We have to do without foil papers, cellophane, platform boxes. We have to use materials which in themselves are less decorative than those we used to have. We have to do with less color in inks and paper. We cannot make new molds for bottles and we have to use stock containers which, of necessity, were designed with far less imagination than private molds. We have to be simpler and more austere even in fields predestined for decoration, for example, in the case of cosmetics packages.

In spite of all this, beauty is not really harmed. Beauty, when everything else is said and done, is an inherent and spiritual quality which expresses in physical form the finest in man.

Beauty is not an arguable point. Decoration is arguable. We can discuss the pros and cons of a house, a dress, a package—their shape, their color, their performance and their relationship to the intended purpose as a whole. But we would never dream of discussing whether or not the Venus of Milo would look better if her nose were a little wider.

Wartime restrictions simplified design

As a matter of fact, many wartime restrictions placed upon packaging have not been nearly as calamitous to beauty as we had at first feared. The stripping of more or less extraneous curlicues has in many cases improved the looks of our packages. It has, more often than not, made them make a little more sense. We had become somewhat complicated and esoteric in our taste before the war. We wasted materials of all kinds not just because there was so much around to be used, but also because we had become so careless in our standards that practically anything was accepted as long as it looked a little different from what the other fellow had, and accelerated the race for competition. We weren't too much worried how basically right, how beautiful a thing was. All we were worried about was to make a thing appeal to as many varying tastes as possible.

That was before the war. Then, bit by bit, we were reduced to brass tacks. Everybody was more or less in the same boat. But if there is ever anything good to be gained by war, this new forced austerity in packaging is most certainly some of it.

Future prospects for basic beauty

In the future lies tremendous scope for new ideas and new materials, if we only set our mind straight now and resolve not to go haywire again and lose basic considerations—among them beauty—in the race for decoration and ideas which are considered good only because they are a little different.

Decorative elements, when they are cleverly used, can cover up for a good many sins and make even life more enjoyable and safer, as all camouflage does. Still, if the basic structure of things is wrong, they will never be, in the basic sense, beautiful. We can dress things up and make them do and we can, at times, even make them good-looking. But while the skill required to do all this is considerable, it does not match the grandeur of real creation.

At that, of course, basic beauty, in many ways, may not be chic, or in the fashion of the moment. There is nothing chic or fashionable about a plug gauge. It does not have to have these characteristics. If we consider chic and fashion as elements which lift the daily drudgery from our shoulders, they are legitimate, and accomplish an important task. But we should not think of them as being the first, or the most important considerations in a packaging job.

Basic beauty is all around us today. We have it in the sweeping lines of a bomber, in the bow of a man o'war. We have it in gears and guns and gauges and all we need to do is to re-apply it to the less formidable items of existence.

Perhaps our wartime reduction to essentials is teaching us a lesson for future days. Perhaps we are learning that function, of itself, breeds beauty. Perhaps we are learning that decoration, or, sometimes, trimming, is right only when it means an extension of basically good design. While we *are* beginning to be tired, today, of the naked austerity of steel and are waiting for the lighter touch to things, we are becoming conscious of a new harmony between fundamentals of design—of beauty—and new methods of decoration, in which the many new materials now developed, will lend a helping hand.

It will be an even more mechanized world when the war is over, but that in itself will mean a greater need for more livable things than those which are purely functional. I don't mean that an icebox should have roses painted on its front door, or that a coffee can must have the picture of a movie star on its cover. What I do mean is that the outside of an icebox does not have to look as cold as the inside ought to be, if it is to be a part of the living scheme of something so much used as a kitchen—and that goes for the coffee can too.

On the other hand, when it comes to designing and packaging the more luxurious and orchidaceous kinds of things such as perfumes and cosmetics and items for home decoration, I don't mean that only those will sell which are completely covered with gold braids and tassels of silk and velvet. What I do mean is that a bottle has to sit firmly on its base and that a stopper must work and that a chair must be made to sit on; but that when these functional factors have been fully considered, there is no reason on earth why construction and shape and color cannot hold great beauty. Or, to look at it from the other side again, the chances are very good that if we think of a package as earnestly and as honestly as we think of an architectural design, we would almost automatically get perfect function through perfect beauty.

Decoration is an element which taste adds to form. Beauty is the breath of life itself. It will take courage, sometimes, to uphold principles like these in the presentation of as ephemeral a thing as a package for salted nuts. But there is nothing too low and no usage is too humble to have the right to demand this kind of attention. The road is wide open for package design. Not just to turn out elaborate containers, elaborately decorated, but to devise mechanical perfection and create undebatable beauty which is not just in the eye of the beholder.

Contract packaging service

by Harold M. Bowman

The packaging field is only partly aware of the important role played by the private-brand packaging service in merchandising. The assumption is that the manufacturer is also the packager of his own trademarked product. While this is true in some cases, especially for the well established nationally advertised brands of goods, more often the producer is relieved to be able to turn over his packaging problems to an expert who is completely familiar with this field.

The contracting packager performs a unique and vital service. Whether or not an industry is equipped for packaging, the manufacturer, who undertakes to develop his goods and carry them through all the packing stages to readiness for market, exposes himself to the possibility of a serious bottleneck in production—and consequently in merchandising. Moreover, unless he indulges in expensive preliminary testing, his chances of failure are greatly augmented. Should he discontinue his product after a short time, or drastically alter its merchandising, the manufacturer is likely to be embarrassed with frozen assets in the form of useless equipment. By contracting for his packaging, however, the producer's expenses extend only to the limit of his contract, and the responsibility for testing and for equipment belongs entirely to the packager.

Users of custom packaging

For the purposes of this article we are mainly interested in the two types of manufacturers to whom a contract packaging service is almost indispensable, and in the requisites which the private-brand packager must meet in order to perform this service successfully. The first one is the small businessman who has a product which he wishes to put on the market, but who lacks the necessary equipment with which to complete the package economically. Without adequate market testing, it is inadvisable for him to consider a capital investment in machinery. He may or may not have had package experience, but he is anxious to market his product with a minimum of changes in design or materials which may often be required by machine operation. Therefore, he is willing to contract for his packaging.

The other type of customer is the large manufacturer who wishes to develop a new product in a test campaign but can't spare the production time on his existing equipment to convert it for small runs of the new product. Like the small manufacturer, he hesitates to purchase new equipment until he has obtained definite indications of the sales potentials of the product. Consequently, both the large and the small manufacturers turn to the private-brand packager with their problems.

Equipment of the custom packager

The first requirement of a good private-brand packager is that he have sufficient semi-automatic equipment to produce economically and yet to be readily convertible for packages of different sizes. He must also have a properly trained personnel accustomed to small runs and able to switch quickly and expertly from one job to another. All of us have in our factories many employees who, due to long service with us in working on our particular lines, are expert workers on our packaging lines. But even the best of them would be thrown off their stride if they were suddenly transferred to another company producing entirely different types of packages. But the employees of a private-brand packager are accustomed to constant shifts from one job to another, and are therefore very much more flexible in making quick changes which result in increased efficiency and lower costs.

But, above all, the private-brand packager must have expert production planning to utilize his labor to full advantage and thus be able to produce at lower costs than



1—Custom packagers not only serve the small business man who has a new product to sell, but also large producers as well. Illustrations on these pages show how 1,166,000 partial dinner units for the Army "10-in-1" Ration are turned out per week in the Chicago plant of Charles A. Brewer & Sons.



2

2—In plants such as this, intensive time studies result in more efficient arrangement of lines, smooth flow of work, and savings in costs.

those obtainable by hand operation. His overhead will be considerably lower than that of the large manufacturer, a factor which permits him to perform a useful as well as an economical function in this field.

The contribution of the custom packager

In the field of package design and development, the private-brand packager is in a unique position in that he has had a very broad and comprehensive experience covering many types and styles of packages. Thus he can offer to a prospective customer a very definite protection against the costly errors in design and planning which so often occur in initial packaging by even the largest companies. With few exceptions, the number of nationally advertised products marketed by any one company is usually limited to ten or less, and often these are related lines, all packed in one type of container. Consequently, the company marketing a line of bottled goods would have little or no experience with canned goods, powders, ointments and the like in metal tubes. Equipment for tube filling and cartoning is expensive and not readily obtained even in those times of peace which we all hope so fervently will soon return. To attempt to fill and carton even a comparatively small number of tubes by hand for a test campaign will require a considerable amount of trained labor, and will unquestionably result in a high unit cost. The custom or private-brand packager can advise on the size and type of tube for the product, and has equipment for high-speed filling. Although carton machines are not as readily adjusted to handle various sizes, they are usually designed for standard sizes, can be utilized for more than one type of product.

The private-brand packager offers still another advantage in the matter of purchases. He is buying packaging materials such as bottles, cases, tubes, cartons, labels, etc., for his various customers, and he can often combine these orders to obtain lower prices. This is particularly true of labels and cartons where the setup and plate charges are excessive on small runs.

Thus we see the unique and important field covered by these packagers, and although they may often develop the packaging of a product to a point where it is economically practical for the owner to install his own production machinery and package his own product, this very fact is a tremendous advantage to them in securing other accounts. Many a fine product would never have reached nation-wide distribution if it were not for the private-brand packagers who first guided it.

3—Here a careful immersion test, supervised by officials of the contract packaging firm, is made to check the seal of the Army dinner unit.

3



4—The good private-brand packager has adequate equipment and trained personnel expert at making switches from one type of job to another.

4



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An Information Sheet for Printers and Designers

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LEGAL AND GOVERNMENTAL CONSIDERATIONS

Government control of package material 94

Packaging for government orders 96

Special federal regulations 101

Progress in standardization 104

How the department of commerce can help 106

Food, drug and cosmetic act 107

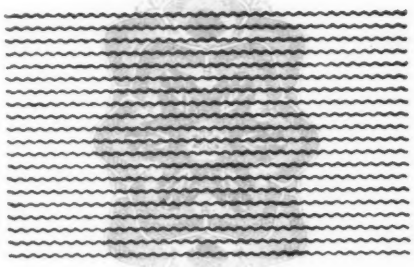
Package and trademark protection 112

Package and trademark trespassing 113

Protecting the results of research 115

Patent review 120

Chart: Officers administering federal and state regulations opposite 108





Government control of package material

For another indefinite period, packagers must look forward to a continuation of government controls of packaging materials. The general problem has become increasingly clear to industry as a whole, and correspondingly the controls have become simpler and easier of enforcement. The program which all agree is imperative for the duration may be summarized thus: war needs first then civilian essentials, then—if there is anything left—nonessential uses. But in the case of nearly all packaging materials there hasn't been anything left. Needs have increased while stock piles have dwindled. Competition among sellers is suspended, to be replaced by competition among buyers.

The shortage picture may be seen by a glance at Table I. As has been observed many times, shortages beget shortages; and the basic shortage which is responsible for many others is that of manpower. In that respect, there will be no relief until demobilization begins.

The following is a list of materials under government control given together with the control order:

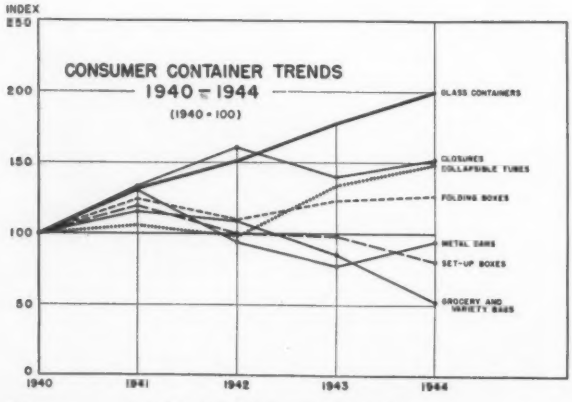
Material or product	*Supply situation*	*Control orders*
Acrylics	Fair	M-300
Adhesives—Starch	Good	M-333
Aluminum	Fair	CMP
Barrels		
Slack Cooperage	Short	L-232
Tight Cooperage	Fair	L-232
Wooden Beer Barrels	Short	None
Bags—Textile	Very critical	M-221
Bags—Grocery & Variety	Very critical	L-261
Baskets, Hampers, Crates	Fair to poor	L-232
Board (Boxboard)	Critical	M-378
Board (Container)	Very critical	M-290
Boxes—Folding & Set-up	Critical	M-378; L-239
Boxes—Wood	Critical	L-232
Cans—Metal	Fair	M-81
Casein	Fair	M-307
Cellophane	Fair	L-20
Cellulose Acetate	Fair	M-300
Closures	Plentiful	L-103-b
Coatings—Protective	Adequate	M-382
Containers		
Corrugated & Solid Fibre	Critical	L-317; D-146; M-290
Glass	Good	L-103; L-103-b
Specialty Flexible	Fair	L-305
Copper	Critical	M-9-c; CMP
Cork	Fair	M-8-a
Drums—Fibre	Fair	L-337
Drums—Steel	Critical	L-197; CMP
Ethyl Cellulose	Fair	M-300
Glues—Animal	Fair to poor	M-300
Lead	Critical	M-38
Machinery	Critical	CMP
Paper	Very critical	Various
Paper—Glassine	Critical	M-286
Paper—Waxed	Fair to poor	M-351
Paper—MVT Barrier	Critical	M-380
Phenolics	Critical	M-246
Polystyrene	Tight	M-300
Rubber—Natural	Highly critical	R-1
Rubber—Synthetic	Plentiful	R-1
Sacks—Paper, Shipping	Critical	L-279
Steel	Tighter	M-81; CMP
Tin	Highly critical	M-43; M-81; M-115
Tubes—Collapsible	Critical	M-115
Urea	Fair	M-300
Vinyls	Fair	M-300
Zinc	Plentiful	M-11-a; M-11-b; M-11-L

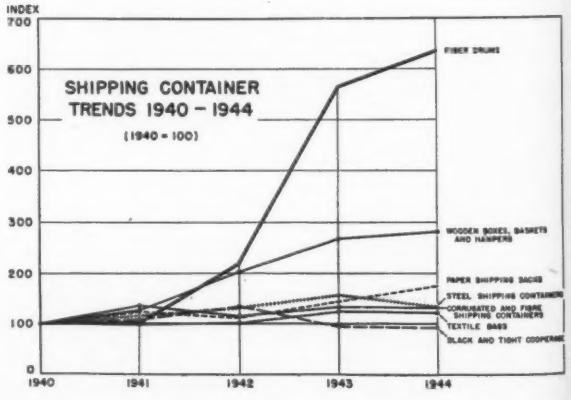
Containers during the war period [1]

Wartime economy has brought a new realization of the importance of containers. Previously underrated, recognition of their importance came comparatively late in the war program. Now without containers for shipment, large scale production is useless.

The volume of containers used has mounted steadily from about $2,000,000,000 in 1940 to close to $3,500,000,000 in 1944, and the increase was achieved in the face of shortages of practically all materials except glass, and even this was limited by the industry's productive capacity. Despite the tremendous increase in volume,

[1] Information, charts and tabulation prepared by Edward J. Detgen, Acting Director, Containers Division, War Production Board. Reproduced by courtesy of "Domestic Commerce."





quantities have still been insufficient, necessitating the restrictions of all types of containers.

Largest increases were in fibre drums; estimated production for 1944 will be 6 times that of 1940. Wooden containers (excluding cooperage) grew to three times their 1940 volume. Paper shipping sacks gained 77 per cent, while cooperage showed a decline of 7 per cent.

In the consumer container group, glass showed greatest increase. Closures did not quite keep pace because of metal restrictions, necessitating re-use in some instances. Collapsible tubes for 1944 are 50 per cent ahead of 1940. Folding boxes are about 30 per cent higher. Metal cans declined 6 per cent; set-up boxes decreased by 19 per cent, and grocery bags dropped 48 per cent.

Reconversion problem

Although in some cases package producers have been manufacturing products for direct military use, in most instances their production has been the same or very similar to their normal civilian operations. For that reason, they face a simple reconversion problem.

New products, new uses and new materials that have been developed will of course call for containers in the postwar period. It is impossible now to estimate the volume that will be required, which will depend on postwar employement and production levels. Some predictions promise greater employment and production than previous peacetime experience. If that comes, container manufacturers may not only equal but actually exceed the records set during the war period. This may be particularly true in those fields where materials controls have been so tight as to prevent certain types of containers from maintaining their normal relative positions.

Meanwhile, since government controls are imperatively necessary, packagers will continue to search for substitutes and develop makeshifts.

TABLE I.—PRODUCTION OF CONTAINERS AND CLOSURES, *1940-44*[1]
[Index: 1940 = 100]

Kind of container and unit	*1940*	*1941*		*1942*		*1943*		*Estimated 1944*	
	Quantity	*Quantity*	*Index*	*Quantity*	*Index*	*Quantity*	*Index*	*Quantity*	*Index*
Consumer containers & closures:									
Metal cans (Thous. tons of steel)	2,180	2,845	131	2,043	94	1,686	77	2,044	94
Metal crowns (Thous. gross)	143,929	217,993	151	180,373	125	216,151	150	226,250	157
Commercial closures, metal (Million units)	5,677	7,529	133	9,193	162	7,898	139	8,625	152
Glass containers (Thous. gross)	52,116	68,973	132	78,615	151	92,707	178	104,000	200
Home canning seals (Thous. gross)	10,000	14,947	149	22,003	220	31,836	318	23,500	235
Milk bottles (Tons)	n.a.	n.a.		n.a.		n.a.		70,900	
Hood & lid cover stock (Tons)	n.a.	n.a.		n.a.		n.a.		20,700	
Liquid tight cylinder cans (Tons)	n.a.	n.a.		n.a.		n.a.		32,500	
Cups & round nested food containers (Tons)	n.a.	n.a.		n.a.		n.a.		92,400	
Ice cream, frozen food and butter cartons (Tons)	n.a.	n.a.		n.a.		n.a.		117,400	
Milk bottle plug caps (Tons)	n.a.	n.a.		n.a.		n.a.		27,900	
Folding boxes (Thous. tons)	1,398	1,732	124	1,536	110	1,722	123	1,773	127
Set-up boxes (Thous. tons)	613	731	119	613	100	600	98	498	81
Fibre cans and tubes (Thous. tons)	n.a.	n.a.		165		307		360	
Grocery & variety bags (Thous. tons)	606	700	116	661	109	518	85	317	52
Specialty flexible containers, incl. hand-made bags & carton liners (Thous. tons)	n.a.	n.a.		n.a.		105		126	
Factory prepackaging bags (Tons)	n.a.	n.a.		n.a.		25		25	
Collapsible tubes (Thous. gross)	3,755	3,965	106	3,695	98	5,050	134	5,565	148
Shipping containers:									
Steel drums and pails (Thous. tons of steel)	735	835	114	965	131	1,162	158	970	132
Fluid milk shpg. containers (Tons of steel)	14,586	22,165	152	27,528	189	21,107	145	24,739	170
Gas cylinders (Thous. tons of steel)	n.a.	n.a.		175		260		243	
Baskets and hampers (Mil. sq. ft. veneer)	1,529	1,498	98	1,442	94	1,227	80	1,000	65
Nailed wooden boxes (Mil. board feet)	4,295	5,500	128	8,840	206	11,838	276	12,500	291
Plywood boxes and drums (Mil. sq. feet)	n.a.	525	[2]100	600	[2]114	700	[2]133	700	[2]133
Wirebound boxes (Mil. bd. ft. veneer)	150	158	105	192	128	165	110	178	119
(Mil. bd. ft. lumber)	220	232	105	282	128	242	110	262	119
Slack cooperage (Thous. units)	35,000	37,829	108	47,300	135	34,100	97	32,460	93
Tight cooperage (Thous. units)	7,000	7,656	109	9,000	130	5,900	84	6,450	92
Textile bags (Mil. yards)	1,493	1,464	98	1,502	101	1,860	125	1,816	122
Metal strapping (Thous. tons of steel)	100	140	140	200	200	265	265	305	305
Corrugated & solid fibre containers (Thous. tons)	3,114	4,279	137	3,586	115	4,138	133	4,123	132
Fibre drums (Tons)	10,000	10,000	100	22,000	220	56,600	566	63,600	636
Paper shipping sacks (Thous. of tons)	220	270	124	251	115	315	144	390	177

n.a.—Not available.
[1] These are total production figures, including containers for the military, civilians and export.
[2] 1941 = 100.
Sources: Department of Commerce estimates based on data supplied by the War Production Board, trade associations, trade journals, and individual companies.

Packaging for government orders

by Henry A. Wolsdorf and Marshall W. Forrest

The greater portion of government packaging and packaging is still for shipment of military, Lend-Lease and relief supplies. During the past year, progress has been mainly along the lines of refinement of details of such packaging rather than of revolutionary development. Futhermore, the methods of handling military packages in the theatres of operation appear to have taken on a rather uniform pattern.

While this article is being written, the Allied armies are invading Germany from the west and from the east. Large ports on the continent have been cleared and supplies landed there are flowing rapidly through well organized channels. At the ports, extensive mechanical handling and unloading equipment is being used and covered storage is available for most supplies. However, in the field, handling, transportation and storage are still carried on under very unfavorable conditions. Under the circumstances, and considering the fact that many military supplies on hand at the end of the European conflict will probably be transhipped to the Pacific theatre, it is evident that the high standards for military packaging must be maintained.

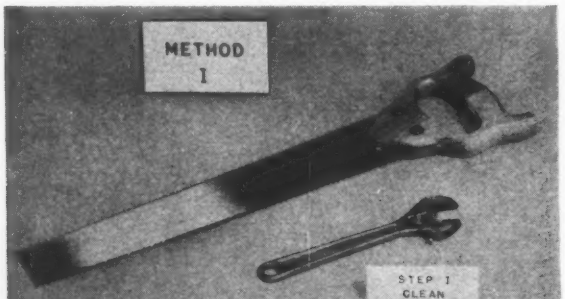
Meanwhile, in the Pacific theatre of war, American troops are hopping from island to island on their way to Tokyo. These movements, sometimes on an elaborate scale, other times on a much smaller scale, have developed into such a uniform procedure as to establish a general tactical pattern.

Supplies for troops usually go forward in several steps. Shipments leaving the West Coast may be landed at a base, such as Pearl Harbor, far removed from the theatre of war. Large volumes of supplies may be concentrated here for immediate or later shipment to advanced bases. To this point, handling is not severe and adequate shelter against the elements is provided. As plans for particular operations are developed, supplies are shipped forward to another concentration point, such as in the New Hebrides or the Solomons. At these bases, and at others still closer to actual warfare, handling and storage conditions are considerably less favorable and the necessity for good packaging becomes apparent.

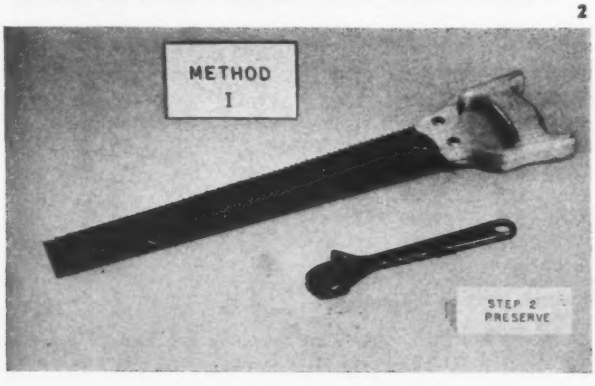
Task forces are supplied at the advanced bases by loading military packages on freighters or various kinds of landing ships or craft. Here the supplies are held for coordination with troop movement. When the eventful day arrives and a landing is made, the supplies are unloaded, possibly under air attack, and are dumped helter-skelter on the shore. Here, without protection against the elements, the supplies may remain for days, or even weeks depending on the success of the landing and the rapidity of establishing and expanding the beachhead. As time passes, the packages are stored outdoors in orderly fashion in stacks that are usually well ventilated and covered on top and part way down the side with tarpaulins.

The above pattern has achieved such uniformity that a fairly definite measure of protection against physical rough handling and water has become possible. In general, it may be said that any military package permitting upward of 20 major handlings and outdoor storage for 18 months will give satisfactory service.

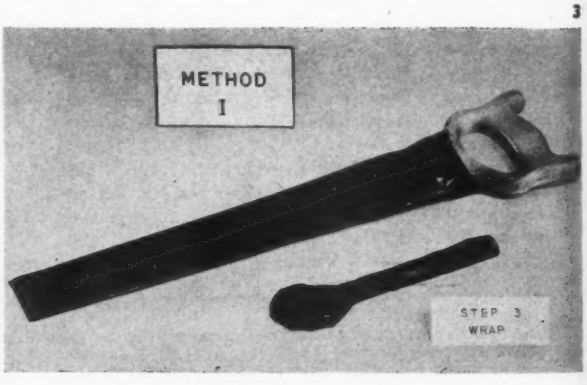
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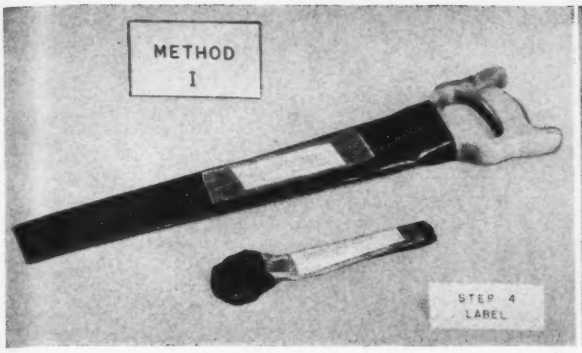
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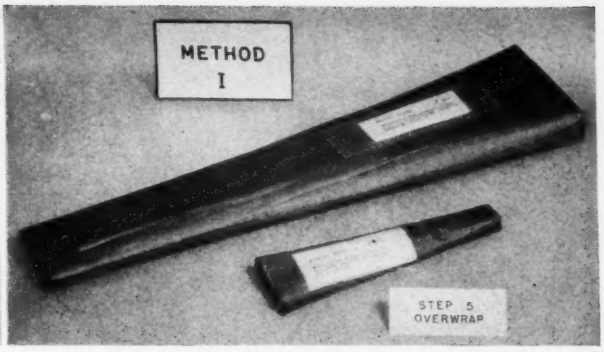


1—Consult specifications before selecting a cleaning agent. After cleaning, dry the item thoroughly using compressed air or oven-drying. 2—Preventive compounds may be applied by spraying, brushing, or dipping. During submersion, parts should be turned frequently to permit escape of air. Heat-dipped items are wrapped after preservative has had time to set. 3—Proper choice and application of wrapper are imperative. Different grades of wrapper serve different purposes.



4

4—Marking must be accomplished by a method which permits prompt identification without risk of disturbing preventive treatment or seal.



5

5—Although it is not necessarily mandatory to employ an overwrap, in order to prevent sticking an effective overwrap may be desirable.

Shipments packed early in 1942 frequently suffered extensive damage due to corrosion or general deterioration after a few months storage in the Pacific theatre. The effectiveness of measures for protection against corrosion which have been developed since that time, is generally known. In the meantime, there has been some anxiety about the effect of mildew and mold on packaging materials, and about what action to take to combat such harmful bacterial attacks.

Repeated inspections do indicate quite definitely now that present packaging, when in accordance with specifications, is affected very little by mildew and mold. In military packing circles, it is generally agreed that the one serious and difficult problem in military packaging is protection against water and moisture.

Tests in the laboratory and field experience in the Pacific area have proven that moisture protection is of primary concern and mold and biological growth protection secondary for those materials most subject to these forms of deterioration—all electrical and electronic equipment, for example. Resistance to mold and biological growth is an engineering problem and not a subject for this article on military packaging. It suffices to say in passing that this subject is being expertly handled by government and industrial laboratories. Information and data obtained by these laboratories on mold and biological growth is collected by the Information Center of the Joint Army-Navy—NDRC Tropical Deterioration Project, Washington, D. C. and is made available to interested parties.

As a result of this, existing specifications for equipment affected by mold and biological growth are being revised to give adequate protection to this equipment in the tropics for many months after being put into service. Additional protection in the field comes under maintenance and not packaging and is being handled by maintenance and reconditioning facilities back of the lines in the theatres of operations.

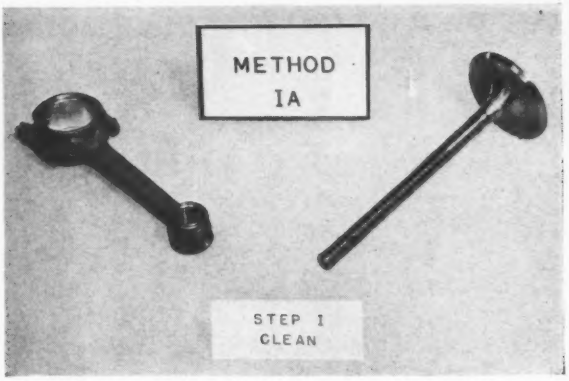
While mold and biological growth do attack some packaging materials, the slight deterioration is not sufficient in most instances to mar their efficiency if they are properly packaged.

Moisture and water protection in military packaging is achieved by proper selection of the method of packaging depending on the degree of protection necessary to preserve the part packaged for ultimate use at the battle-front. Before reviewing the accepted standards, the use of the term "tropic-proof package" should be explained. While some countries differentiate between tropic-proofing, arctic-proofing and packaging for the European theatre, the Technical Services of the Army, Bureaus of the Navy and the Army Air Forces package most war equipment to withstand any temperature and humidity range that might be encountered. Rigid Army and Navy specifications require packages to withstand performance tests of 150° F. and higher, and 0°F. and lower in some instances, and at relative humidity 0—100 per cent. In short, whether a part such as a bolt or nut is packaged Method I, a cork gasket Method I-A or a radio transmitter Method II, it must withstand the above temperature and humidity ranges and be in serviceable conditions when removed from the package at the front.

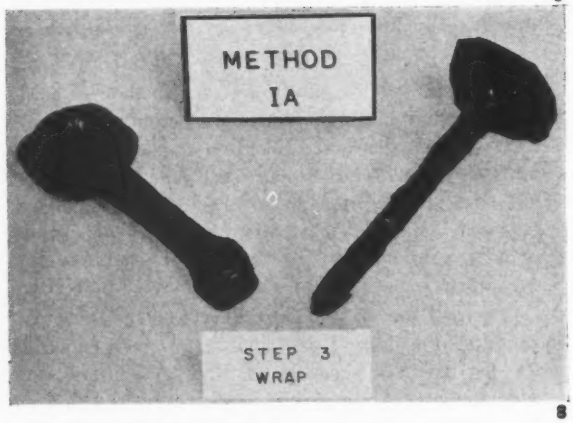
The Methods I, I-A and II originally devised more than 3 years ago and adopted by all branches of the armed services, are still the basic methods used by all. Research by government agencies and private concerns has developed new variations of the non-waterproof, waterproof, and moisture-vaporproof unit packs respectively. As a result, there are now 5 basic methods for packaging, with Method I-A and II having 5 variations each. These methods and variations, listed below, have been standardized within the Technical Services of the Army, Bureaus of the Navy and Army Air Forces, and form a part of the new *joint Army-Navy* specification, *JAN-P-116, Packaging and Packing for Overseas Shipment; Preservation, Methods of,* expected to be issued soon. As additional methods or variations are developed and proved, revisions will be made to this specification.

Method O: No Preservation—Packaging for Mechanical and Physical Protection—This is specified for parts requiring no preservation, so it is only necessary to use packaging materials for mechanical and physical protection.

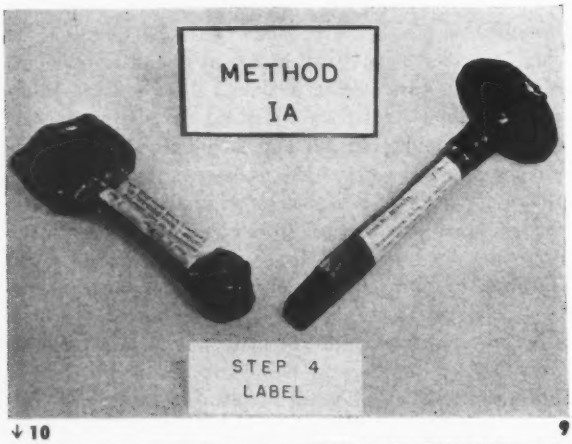
Method I: Corrosion Preventive Compound Coating, plus Greaseproof Wrap—This method requires that parts be cleaned, preserved, and wrapped according to applicable specifications with the correct grade and type of



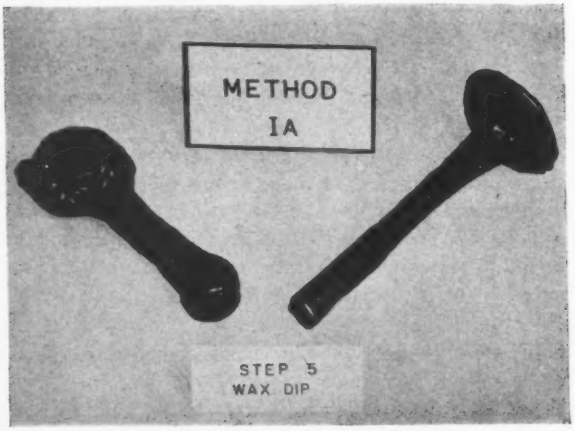
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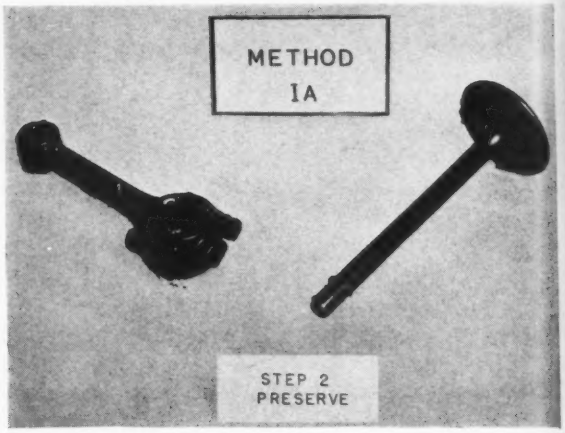


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6—Surfaces must be clean before preservative is applied. 7—Active surface agents keep moisture out. 8—Grades A (red) and C (green) are primary wrappers for vulnerable metallic surfaces; grade B is for non-critical surfaces. 9—Identifying labels are attached to wrappers before items are dipped in sealing wax. 10—Treated, wrapped article dipped in sealer compound. 11—Heat-dipped C wrap needs overwrap.

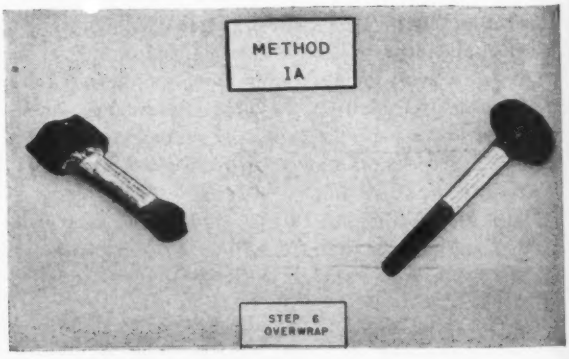
greaseproof barrier material *(Joint Army-Navy Specification JAN-P-121)* and additional packing materials, if mechanical protection is required.

Method IA: Waterproof Unit Pack, plus Corrosion Preventive Compound Coating on all Corrodible Surfaces.—Parts are cleaned and preserved as in Method I, but waterproofness is obtained by one of the following 5 variations of this method:

Method IA-1: Conforming Wrap Dip-Coat Seal—The correct type of Grade C greaseproof barrier material is applied tightly around the part (in some cases a Grade A greaseproof barrier material is first wrapped around the part to prevent any transfer of wax to highly machined surfaces). The wrapped part is then dipped into the dip-coat sealing compound *(Joint Army-Navy Specification JAN-P-115)*. This, in turn, is overwrapped in a glassine or kraft paper to prevent blocking of parts when packed in a larger container.

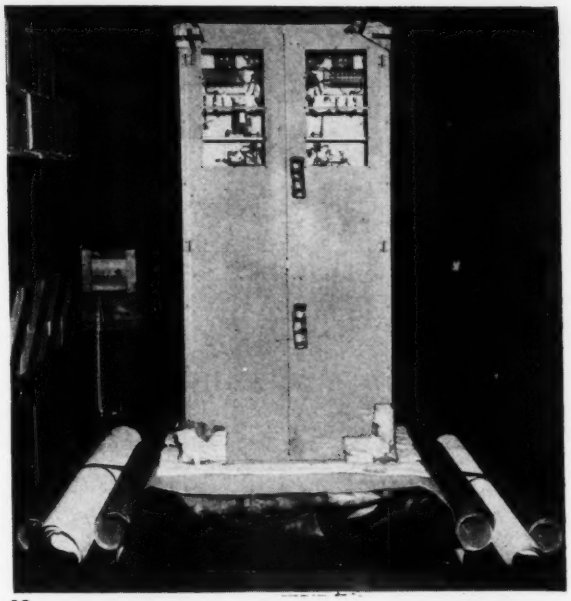
Method IA-2: Carton Overwrapped. Dip-Coat Sealed—The correct type of Grade A greaseproof barrier material is wrapped around the part, placed in an interior folding or set-up carton (using a cushioning material if necessary) and tightly overwrapped with Grade C greaseproof barrier material. The wrapped

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Photos on this page and next demonstrate Method II applied in packing a heavy radio transmitter. 12—Appropriate base is selected. 13—Protection for barrier and cushioning are arranged and transmitter mounted. 14—Inner protection and barrier folded snugly around transmitter. 15—The heat-sealing iron should be applied according to instructions. Appearance of slight brownish tinge on foil backing is permissible.

box is then dipped into a dip-coat sealing compound and overwrapped as described in Method IA-1.

Method IA-3: Greaseproof-Waterproof Bag, Sealed—The preserved part is placed directly into a greaseproof-waterproof bag meeting applicable specifications and sealed by pressure-sensitive tapes, waterproof tapes, or heat-sealed. One or more packaged parts are placed in an interior container with the necessary cushioning material.

Method IA-4: Same as method IA-5.

Method IA-5: Rigid Metal Container, Sealed—The cleaned part or parts are wrapped in the correct grade and type of greaseproof barrier material, properly cushioned, and placed in the correct size of rigid metal container permitting only the minimum amount of void. This variation of Method IA packaging can only be used in special applications with the approval of the procuring agency.

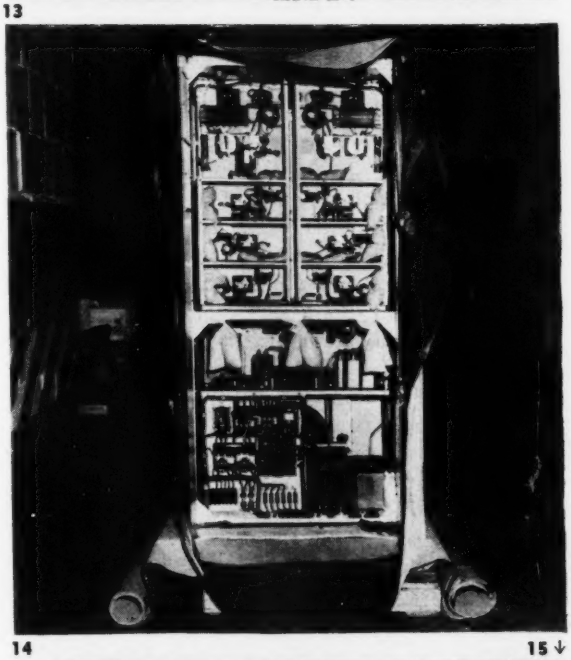
Special Methods: Any methods deviating in detail from any one of the foregoing procedures or forming a combination of them is considered a special method and will be used only with the approval of the procuring agency.

All unit packaged parts, regardless of the type of Method IA used, must pass cyclic exposure test in *Joint Army-Navy Specification JAN-P-116.*

Method 1B: Strippable Compound Coating—The cleaned parts are dipped in a strippable compound coating according to applicable specifications, cushioned or wrapped and placed in an interior container. This method may only be used with the approval of the procuring agency.

Method II: Dehydration—The part or assembly is first cleaned and a light preservative is applied to any surfaces that can be preserved to assist the desiccant in corrosion protection. There are 5 accepted methods for making this Method II pack as follows:

Method IIA: Floating Bag—Class A Floating Bag



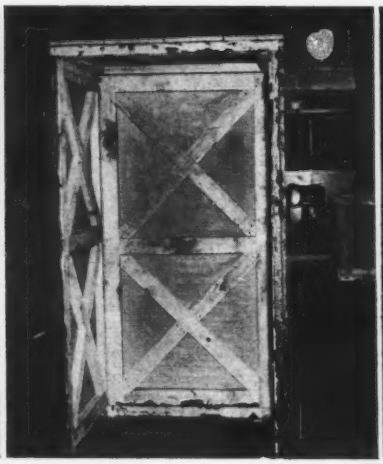
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16—Approximately 80 per cent of the air should be drawn from inside the barrier as sealing takes place. Evacuation and complete sealing of the barrier should be accomplished within a few minutes after the dehydrating agent is adjusted inside the barrier. 17—Construction of crate must conform to Army Specifications 100-14A. 18—Only nails in skid need to be removed to unpack. Crate may then be used to repack equipment.

Type. Generally, the item may be prepared by bolting to a base or skid. The material used for this base or skid may vary from fibreboard to heavy lumber depending upon the size and weight of the part. For most packages, water-resistant plywood is recommended. Holes should be drilled in the base corresponding to the holes in the part. Bolts are placed through these holes and a moisture-vaporproof barrier *(Joint Army-Navy Specification JAN-P-131)* previously preformed with the necessary gaskets are placed over these bolts. The part is then placed within this moisture-vaporproof barrier with a predetermined amount of desiccant after which the final closure is made by any of the approved closing methods. The manufacturer's seam and other openings are sealed with water-resistant tape *(Joint Army-Navy Specification JAN-P-127)*. This unit is then inserted in a container which will be sealed with water-resistant adhesives.

Method IIB: Container-Barrier-Container—The part or assembly is placed in an interior carton with a predetermined amount of desiccant with the necessary cushioning material and sealed. The corners of the carton are broken down to prevent rupture of the barrier at these points. The carton is placed in a bag made of preformed moisture-vaporproof material and sealed by any of the approved closing methods. The flaps of the bag are folded carefully against the container and placed in an exterior container of such size that the inner container and bag make a snug fit. The exterior container shall be properly sealed with waterproof tape at all open joints.

Method IIC: Container Overwrap—The part or assembly is properly cushioned in an interior container with a predetermined amount of desiccant and tightly sealed with tape. The closed container is overwrapped in the correct type of Grade C greaseproof barrier material and dipped in a dip-coat sealing compound and overwrapped to prevent blocking as in Method IA-1.

Method IID: Cushioned-Bag-Item—In this Method all of the sharp projections of the part or assembly must be covered with neutral cellulose wadding, felt, Grade C greaseproof barrier material or other approved cushioning materials or completely wrapped in any one of the above. Specially designed corrugated or die-cut pads may also be used for cushioning. The cushioned item is then placed in a moisture-vaporproof bag or envelope with a predetermined amount of desiccant and sealed by any of the approved closing methods. In some instances, it is necessary to completely wrap the item with Grade A or Grade C greaseproof barrier material necessary to prevent corrosion to critical metallic surfaces which come in direct contact with the cushioning material.

Method IIE: Rigid Metal Container—The item or assembly, properly cushioned, using materials as mentioned in Method IID above, is placed in the correct size of rigid metal container with a minimum amount of void with the predetermined amount of desiccant and sealed by approved methods. This variation of Method II packing can only be used in special applications and usually the procuring officer requires the packaged item to be subjected to certain rigid performance tests and to pass these successfully.

Modification and combinations of these basic methods may be necessary to package certain equipment such as crankshafts and large electrical and aeronautical equipment. For example, the interior of a major unit may be protected by sealing all openings with moisture-vaporproof tape and dehydrating with the exterior of the unit protected by the application of a corrosion preventive compound and placed in an exterior wooden container properly cushioned and braced.

With the proper selection of one of these methods of packaging and strict adherence to *JAN-P-116* specification mentioned previously and other JAN specifications for exterior containers, military supplies will arrive at the front in serviceable condition and will be free from corrosion and deterioration.

Special federal regulations

Government agencies and certain semi-official organizations (representing such groups as the railroads or freight carriers) have set up rules and regulations to which—when applicable—packagers are required to conform. The new and the more important of these regulations are discussed here.

Postal department regulations

The Post Office Department has prescribed regulations as to the preparation, wrapping and packing of parcel-post or fourth-class mail matter. These regulations are contained in Circular 3 of the Division of Letters and Miscellaneous Mail, available through any postmaster and in circular issued by the Second Assistant Postmaster General, entitled *Preparation, Wrapping and Packing of Mail Matter.*

Examination—Fourth-class matter must be so packed that the contents may be examined easily by postal officials. When not so packed, or when it contains writing not authorized by law, first class postage is required.

Nailed boxes—Parcel-post mail may be enclosed in boxes of which the lids can be readily removed with a chisel or screw driver for examination of contents.

Containers and packing—All matter must be securely packed and wrapped or packed in a strong container so as to bear transmission without breaking or injuring the mail bags, their contents or the persons handling them.

Containers previously used for shipping high explosives having a liquid ingredient (such as dynamite) must not be used for shipments of any article by parcel post. Containers which have been used for the shipment of other high explosives must have all marks removed before shipment by parcel post.

Harmful articles not absolutely excluded from the mails, but which, from their form or nature, might, unless properly secured, destroy, deface or otherwise damage the contents of the mail bag or harm the person of anyone engaged in the postal service, may be transmitted in the mails only when packed in accordance with the postal regulations.

Pyroxylin plastics (Celluloid, Fiberloid, Pyralin, Viscoloid, Zylonite, etc.), in sheets, rods or tubes, must be packed in strong spark-proof wooden boxes and to each parcel must be attached the diamond-shaped yellow caution label fully described in Section 588, Postal Laws and Regulations.

As an exception to the above, pyroxylin sheets in packages not exceeding one-half inch in thickness may be packed in containers made of two thicknesses of strong double-faced corrugated fibreboard and small quantities may be shipped in strong strawboard tubes lined with 0.002-in. single-faced corrugated strawboard.

Admissible liquids and oils in packages not exceeding the limit of weight of fourth-class matter will be accepted for mailing when intended for delivery at the office of mailing, or on a rural route starting therefrom, when enclosed in securely closed containers, provided it is not necessary to ship by steam or electric railways.

Admissible liquids and oils, pastes, salves or other articles easily liquefiable shall be accepted for mailing, regardless of distance, when they conform to the conditions prescribed by Section 590, Postal Laws and Regulations, which may be consulted at any post office.

Mailable liquids in tightly-closed metal containers in quantities of 1 gallon or more shall be accepted for mailing when suitably boxed or crated to be dispatched outside of mail bags and labeled "Fragile—liquid. This side up," but when in extra-strong metal containers, the boxing or crating may be omitted.

Fragile articles—Articles easily broken must be securely packed in wooden or strong double-faced corrugated fibreboard boxes with ample cushioning material of excelsior, crushed paper or the like, completely surrounding each article to prevent damage. All such parcels must be labeled "Fragile."

Perishable articles must be marked "Perishable"and it is advisable that they be sent as special delivery matter by affixing stamps for the special delivery fee in addition to the regular postage, thus expediting their delivery. Articles likely to spoil within the time reasonably required for transportation and delivery will not be accepted by post office authorities for mailing.

Unmailable matter—All matter is unmailable which is of a harmful nature, such as poisons, explosives and corrosive articles, etc.

Further information may be obtained from:

Third Assistant Postmaster General, Division of Letters and Miscellaneous Mail: for rules on the classification and admissibility of matter as parcel-post mail, rates of postage, limit of weight and size, manner of addressing and wrappings so as to permit examination, permissible enclosures and additions, attaching communications to parcels, etc., and for additional copies of Circular 3.

Third Assistant Postmaster General, Division of Registered Mails: for rules on the insurance, C.O.D. (including demurrage charge) and registry features.

Second Assistant Postmaster General, Division of Railway Mail Service: for rules on the admissibility to the mails and wrapping and packing of matter which from its form or character would be liable to injure the mails or the person of postal employees.

Liquor packages and labels

The Alcohol Tax Unit of the Bureau of Internal Revenue of the Treasury Department of the United States is charged with the administration of laws and regulations concerning distilled spirits, wines, fermented malt beverages, cereal beverages, industrial alcohol and related

products. Under these, the Bureau regulates the size, marking, use and re-use of containers designed or intended for use for the sale and resale of distilled spirits. The regulations governing the production, blending and bottling of alcoholic beverages are many and varied. The following pamphlets are available from the Superintendent of Documents, Washington, D. C.:

No. 4.* Labeling and Advertising of Wine.
No. 5.* Labeling and Advertising of Distilled Spirits.
No. 6. Bottling of Distilled Spirits in Bond (as amended May 18, 1944).
No. 7. Relative to the Production, Fortification, Tax Payment, etc., of Wine.
No. 7.* Labeling and Advertising of Malt Beverages.
No. 11. Bottling of Tax Paid Distilled Spirits.
No. 13. Traffic in Containers of Distilled Spirits.
No. 15. Rectification of Spirits and Wines.

The wine brand label must bear:

1. Brand name
2. Class and type
3. Name and address of bottler or importer, preceded by the phrase "Bottled by" or "Imported by" as the case may be, except that such information may appear on a separate strip label, front or back, if the name and address of the person for whom the product is bottled, preceded by the phrase "Bottled for," or "Distributed by," is on the brand label
4. The alcoholic content by volume is required under the provisions of the Federal Alcoholic Administration Act only on labels of wine containing more than 14 per cent of alcohol by volume. However, Internal Revenue Regulation 7, 11 and 15, described above, require statements of alcoholic content, by volume, on labels of all wines bottled on bonded winery, bonded storeroom, taxpaid warehouse, or rectifying premises
5. The net contents, unless such statement is blown or branded in the container

On the distilled spirits brand label—The mandatory information requirements are as follows:

1. Brand name
2. Class and type
3. The names and address of the distiller, rectifier, bottler or importer, preceded by the phrase "Distilled by," "Blended by," "Made by," "Prepared by," "Manufactured by," or "Imported by," whichever may be applicable. If, however, the name and address of the retailer or distributor, preceded by the phrase "Bottled for," or "Distributed by," appears on the brand label, the foregoing mandatory "Name and Address" information may appear on a separate label, front or back
4. The age of brandy, if less than two years old

On the Government label—Unless all of the mandatory information (including the following) appears on the brand label, a separate back label known as the Government label must bear the following information:

1. Class and type
2. Alcoholic content by proof, except in the case of cordials and liqueurs and specialties, when the alcoholic content may be in volume percentage
3. Net contents, unless blown in the bottle
4. Age or storage statement (in the case of whiskey, or one of the varieties of straight whiskies) and percentages (in the case of blended whiskies or blends of straight whiskies)
5. Percentage of neutral spirits (when required) and name of commodity from which distilled
6. Artificial or excessive coloring (if used)
7. The state of distillation (in the case of whiskey or any of the varieties of straight whiskey)

It should be noted that although only labels affixed to bottles of distilled spirits introduced in interstate or foreign commerce are subject to the labeling provisions of Regulation No. 5, similar labeling requirements are contained in Regulation No. 13, which are applicable to all distilled spirits packaged for sale at retail, irrespective of whether or not such spirits are intended for introduction into interstate or foreign commerce.

On the malt beverage brand label—In the case of malt beverages, the following label information is required to appear on the brand label:

1. Brand name
2. Class and type
3. Name and address of the brewer or bottler. In addition, the name and address of a distributor or retailer, preceded by "Distributed by" or "Bottled for" may appear on the brand or back label
4. Alcoholic content statements may not appear unless specifically required by state law
5. Net contents

Generally speaking, all of the labeling regulations under the Federal Alcohol Administration Act provide the following requirements: contrasting background, size of type, English language, location of label, labels firmly affixed, additional information on labels, representations as to materials.

The regulation also provide for the submission to the Bureau of full and accurate statements of composition when required.

The regulations also list certain prohibited practices such as the stimulation of Government stamps, the use of misleading statements and statements relating to curative or therapeutic effects.

The Federal Alcohol Administration Act provides also for the issuance of certificates of exemption from label approval, if the bottler, producer, blender or wholesaler of wine is able to show to the satisfaction of the Bureau that the alcohol beverages to be bottled will not be sold, or offered for sale, or shipped, or delivered for shipment or otherwise introduced in interstate or foreign commerce. The statute provides, further, that alcoholic beverages may not be bottled or introduced into commerce unless the bottler has in his possession either a certificate of label approval or certificate of exemption from label approval covering the labels used in such bottling operations. Applications for certificates of label approval

* These regulations were issued pursuant to the provisions of the Federal Alcohol Administration.

(Form 1647) or exemptions from label approval (Form 1648) may be obtained from the local office of District Supervision, Alcohol Tax Unit.

Detailed information as to the requirements of the various regulations governing the labeling of distilled spirits, wine and malt beverages, may be obtained from the Alcohol Tax Unit, Bureau of Internal Revenue, Treasury Department, Washington, D. C.

Regulations 5 and 13 prescribe standard sizes for liquor bottles. They are: 1 gal., ½ gal., 1 qt., ⅘ qt., 1 pt. and ½ pt. In addition, ⅘ pt. containers are permissible for bottling Scotch and Irish whiskies, and Scotch and Irish type whiskies, as well as brandy and rum. Regulation 5 also provides for standard size containers of specified sizes of less than ½ pint.

The regulations also provide for the application of tax stamps over the mouth of each bottle of distilled spirits, or compounds containing distilled spirits and on certain types of wines. Stamps may not be concealed or obscured. The Internal Revenue Regulations also provide for the manner of affixing stamps on bottles, as well as stamps and markings on cases and barrels.

Under the Wheeler-Lea Act, an amendment of the Federal Trade Commission Act passed in March of 1938, the Commission was given more effective powers of control over false advertising of foods, drugs, devices, and cosmetics. Detailed information may be obtained from any office of the Commission.

There are a number of statutes, relating to foods, viruses, serums, toxins, insecticides, etc., that fall under the jurisdiction of the Food and Drug Administration: the Filled Milk Act, the Import Milk Act, the Tea Importation Act, and the Federal Caustic Poison Act, together with the following which relate specifically to the Federal Food, Drug and Cosmetic Act: the Act of March 4, 1923, defining butter and providing a standard therefor; the Act of July 24, 1919, defining wrapped meats as in package form; and the Seafood Act of August 27, 1935. Department of Agriculture administers the Insecticide Act.

Labeling of wool products

One of the important special statutes is the Wool Products Labeling Act of 1939, which became effective July 15, 1941. Under its rules and regulations every wool product subject to the Act must be marked by a stamp, tag, label or other means of identification in conformity with its requirements.

The information on the identification must include the fibre content of the product, the maximum percentage of any non-fibrous loading, filling or adultering matter, in the total weight of the product, and the name of the manufacturer, or of a person subject to Section 3 with respect to the product.

Such name need not appear upon the label if it bears an identification number registered and assigned by the Federal Trade Commission as the mark that identifies the manufacturer and by which the latter is bound as fully as though his name were used, provided that in addition to this number, the label or mark of identification bears the name of at least one seller, whether retailer or other seller. The name of the seller, together with the manufacturer's registered number and the content information, should remain on the label.

To use a registered number instead of his name upon the label or mark of identification on his product, a manufacturer may make application to the Federal Trade Commission. The Commission will assign to him such registered number or numbers as are appropriate for his use and suggest the form for the label or mark.

Such application to the Commission must be in writing, duly executed under oath or affirmation. At least two fully executed copies of the application should be submitted. Blanks for this purpose are not furnished by the Commission, but the required text of the application is given in the Regulations which may be obtained from the Commission.

The application must be accompanied by a statement of the business conducted by the applicant and designation of the wool products he manufactures or sells.

The stamp, tag, label or other identification, must be appropriate to the nature of the product and must be affixed securely enough to remain on the product in good condition throughout the sale, distribution and handling of the product until it is delivered to purchaser. The required information may be stenciled, imprinted or branded upon the product itself, or placed on the product in the form of a strong, durable label securely sewed, stapled or pasted thereon, or attached to the product by means of a strong durable tag securely tied to it.

The label or other mark of required information must be affixed to and displayed on the container, wrapper, binder or other means of packaging of wool products:

1. Where marking the product itself is impossible, or where such markings would be inadequate to give consumers the required information or to prevent deception: or—
2. Where the wool products are marketed or sold and delivered in a container that remains intact until after it is delivered to the consumer. If possible the packaged product must also be marked appropriately to show the required content of fibre and material, especially if it is likely to be removed from the sealed container or the container is to be opened for purposes of display, sales or other reasons, before it is purchased. Where the product bears a label or mark of identification which is clearly visible to the purchaser, no label or mark of identification need be placed on such container.

The stamp, tag, label or other mark of identification required under the Act, or the required information contained therein, must not be minimized, rendered obscure or inconspicuous or be so placed as likely to be unnoticed or unseen by purchasers by reason of such labeling deficiencies as:

1. Small or indistinct type
2. Failure to use letters and numerals of equal size and conspicuousness in naming all fibres and percentages of such fibres as required by the Act
3. Crowding, intermingling, or obscuring with designs, vignettes, or other written, printed or graphic matter

Progress in standardization

by William E. Braithwaite

While the entire packaging industry will continue devoting its full time and productive capacity to the support of the war effort during the difficult days which lie ahead, the problem of how to improve packing, handling and transporting of commodities in the postwar period is a matter of primary importance to all manufacturers and distributors.

When the history of the war is written it will be shown that industry has done a remarkable job in overcoming unprecedented difficulties in making possible the safe delivery of immense quantities of war materials to our fighting forces in all parts of the world.

Some significant developments which have been taking place during these war years will be utilized in rendering assistance to the users of all forms of packaging during the postwar period. The so-called consumer package business should find increasing demands after the war, as there are many factors working in favor of the prepackaging of consumer sales units.

The pressure for reduced distribution costs, will be the concern of all manufacturers and distributors after the war as it has been in the past. Since most manufactured products require some form of package or container, the best method of packing and the best type of package for a particular product constitutes one of the fundamentals of economical and efficient methods of product distribution and merchandising.

Coincident with the movement for reduced distribution costs through simplified packing, there has developed a widespread and systematic effort to simplify sizes and types of containers and packages. The Division of Simplified Practice, set up in the National Bureau of Standards over 20 years ago, has served as a clearing house or central agency through which manufacturer, distributor and consumer groups can cooperate in a nationwide program for avoiding the waste formerly caused by a needless variety in sizes, types, dimensions, models, patterns, or "line numbers" of commodities. The immediate objective has been to abandon all odd and unnecessary items and concentrate upon a simplified line that will meet all requirements without clogging the machinery of distribution, and without in any manner slowing down the rate of turnover.

More than 200 Simplified Practice Recommendations, which have been developed by the industries concerned promulgated under the cooperative procedure of the Division, are records of retained items or varieties considered adequate for normal demands. Many of these 200 Simplified Practice Recommendations are for containers and for packages.

In the interest of coordination and consequent economy, each step in the handling of a product should be considered both independently and with respect to related steps, beginning with the unit package, or primary container (in which the product is packed by the manufacturer), through the shipping container, the method of handling, and finally the best means of transportation to reach the ultimate consumer.

Excessive variety in the sizes and shapes of the primary (consumer) unit made it necessary to manufacture the secondary and the shipping container in an enormous variety of sizes and shapes. The shipping container is usually handled more often than the unit package, and, for this reason, should be given at least as much consideration. The size of the shipping container is dependent not only upon the size of the unit package and the number of units in the container, but also upon the method of transportation and the amount of handling to which it is to be subjected.

Palletized loads

A relatively new philosophy of simplified packaging, which effects tremendous economies in shipping space and handling costs is the use of pallets in the shipment of merchandise. The use of the pallet is not new, but its full possibilities were not realized in practice until the Navy and War Departments applied the system to their operations. Faced with the necessity of transporting millions of various-sized items at a time when any delay or waste of shipping space might precipitate critical war emergencies, the Navy developed a simple, time-saving, labor-saving, and space-saving formula for expediting the handling of the colossal volume of merchandise and supplies which passed through its depots in a never-ending stream. The basic theory of the "palletized load" is to design shipping containers and pallet sizes or dimensions to fit a freight car instead of designing them to hold a certain amount of merchandise.

The claims which had been made for the pallet system in streamlined grocery warehouses brought about the request that the Bureau of Foreign and Domestic Commerce of the U. S. Department of Commerce, study selected one-story pallet operations to determine whether or not the claims made were justified. A survey was made some time ago among a group of wholesale grocery warehouses to determine the practical advantages of streamlined distribution over the older methods. The houses visited ranged from small to large as to footage, sales volume, and tonnage.

The survey disclosed that because of wartime restrictions some wholesalers with modern warehouses felt that they had to abandon their assembly lines, for the time being at least, and return to outdated methods of order picking from all stock, manual tiering, and case-by-case handling. This turning back was necessary according to these firms, because their inventories became unbalanced, while new lines, new brands, and changes in packs, made continuation of the assembly line difficult.

On the other hand, some of the one-story operators have had no trouble in continuing to use up-to-date equipment and the best techniques. More important, they continue to operate at very low cost. Several of the firms visited or studied perform all warehouse functions and pay their occupancy costs, inventory costs and the wage costs associated with receiving, storing, order selection, and truck loading, for approximately 2 per cent of sales.

The most modern houses with the lowest warehouse costs use the pallet system of operation, linked with either punch-card or a preprinted order form office procedure. This pallet type of operation involves the use of fork lifts or other self-loading automotive types of tiering equipment. It enables all internal handling of merchandise to be on a block basis and permits a very much shorter assembly line than do other systems. Needless to say, the operation is faster.

The recent survey developed the need for standardization of skids and pallets in order that such loaded platforms might flow readily and further, vertically, through the various stages of distribution in the grocery trade. The results of the survey revealed that some wholesalers received carlot and dray-lot shipments packed in cars or drays, case by case, and made these up into pallet or skid loads at the receiving dock or platform, thus duplicating the case-by-case handling that had to take place when the manufacturer or other shipper loaded the car or dray.

The need for pallet standardization was brought to the attention of the Division of Simplified Practice of the National Bureau of Standards with the suggestion that steps be taken to set up a simplified list of recommended standard sizes or dimensions for pallets along the same line as that worked out for skid platforms in 1930. At the joint invitation of the National Bureau of Standards and Bureau of Foreign and Domestic Commerce, an informal conference was held at the Department of Commerce on August 16, 1944. Representatives of various interested groups were present at this meeting, and it was unanimously voted "that in view of the recognized value of a simplification and standardization of pallets and skids, it is the sense of the meeting that exploration of the possibilities should be undertaken by the Department of Commerce."

The Division of Simplified Practice through personal contacts and considerable correspondence has discovered that interest in the use of pallets and their standardization is now far reaching. An investigation and *Report on the Use of Pallets for Handling and Transportation of Materials* issued by the War Production Board are outgrowths of the conference held at the Department of Commerce in August, 1944.

The sheer magnitude of modern military operations and the adoption of devices and techniques of packaging and moving material with maximum speed and safety have revolutionized the handling and transportation of equipment and supplies used by the Army and Navy. Industry will discover that these new methods will revolutionize thinking in many fields of production and distribution. The Naval Ordnance Materials Handling Laboratory located at the U. S. Naval Ammunition Depot, Hingham, Mass., has been responsible for some outstanding developments, many of which are of universal application. An examination of the functions of this laboratory and the reading of their publication called *The Palletizer* will give many clues to the future of the pallet method of handling shipments.

Containers designed to fit boxcars

In the case of the Brooklyn Naval Clothing Depot, a critical situation arose almost overnight because of the staggering quantities of clothing items which had to be handled. This volume increased very suddenly in the early days of the war, and if older methods had been retained all facilities would have been swamped. The figures quickly mounted to over a million garments per day or 1000 carloads and truckloads per week valued at about half a billion dollars a year. In fact, almost overnight the Depot became one of the world's largest clothing manufacturers and handlers. Something revolutionary in materials handling methods and in container design became imperative.

Casting aside all previous packaging methods, the Depot made a complete new approach to the subject by *designing their containers to fit the boxcar rather than to fit the contents*, and by adopting every existing modern device that would speed up handling of containers and the packing of them into cars as well as ships. Starting with the dimensions of the boxcars the floor was divided up into four-foot squares. This meant two squares across the width and nine or eleven squares down the length, depending on the kind of car. They then ordered tens of thousands of four-foot square wooden pallets.

There doesn't seem to be any good reason why many industries cannot adopt this identical procedure especially when the contents are of such a nature as to "fit the container which fits the pallet which fits the boxcar." All that is required are the fork trucks, a supply of pallets and the courage to revise container and package sizes and container handling methods. The next important step is the establishment of a simplified list of sizes or dimensions for pallets; also, some convenient arrangement must be worked out for the manufacture, pooling, return, and efficient use of the standard pallets. It should be pointed out that the fast unloading of railroad cars is a matter of vital importance at this time when there is a shortage of equipment, materials, and manpower.

At a preliminary conference held in Chicago on January 22, 1945, on this subject, representatives of various interested groups discussed this matter and the appointment of four committees was authorized to assist in drafting a Proposed Simplified Practice Recommendation for Pallets. These committees are to represent the following groups: (1) transportation facilities (2) materials handling equipment manufacturers (3) processors and manufacturers of grocery items (4) distributors of groceries. It is thought that committees representing other groups will be added later and that out of all will evolve a permanent committee. This movement to establish a simplified list of standard sizes for pallets will be followed with considerable interest.

How the department of commerce can help

by Russell I. Whyte

The problem of rebuilding a war-devastated world confronts not only those nations involved in the conflict, but every country and every people. The day when an individual could "let the rest of the world go by" has passed. Passed likewise is the time when the American businessman could ignore developments in other lands.

In 1913, Congress established the Department of Commerce "to foster, promote and develop the foreign and domestic commerce of the United States." Four out of the six bureaus through which the Department now functions maintain services for assisting businessmen.

The Department's Field Service is operated through 26 offices in strategically located business centers in many sections of the United States. The Field Service brings Washington to the doorstep of business and makes available the vast amount of data gathered and compiled by the diplomatic and consular officers of the State Department. The Field Service also represents the Foreign Economic Administration in disseminating information and in giving advice on export control regulations.

The Bureau of the Census is recognized as the general fact-finding agency of the Government. Its function is to publish data on conditions in the United States.

The census of agriculture, taken every five years, is illustrative of one contribution of the Bureau of the Census. Statistics on livestock and crops made available as a result of the agricultural census may be especially useful in determining packaging needs.

The census of manufactures, including information on the location of the plants, costs of materials, inventories, and the quantity and value of products made, is likewise of value to packaging concerns. While the Bureau suspended the collection of these data during the war, it has conducted in its place numerous surveys on production, flow of materials, and other matters vital to the war.

The census of business provides information on retail, wholesale, service, hotel and construction establishments, giving location, status as chain or independent, volume of business, analysis of sales, etc. Statistics on current trends in retail and wholesale trades are issued monthly.

Foreign and Domestic Commerce is also most useful. This bureau concerns itself with interpreting American business to the Federal Government and explaining Government to business. Businessmen can obtain two types of service here—personal and published. Both services are available either at Washington or at field offices.

The information which funneled into the Bureau from all parts of the United States and from abroad is weighed, sifted, analyzed and then published in the form of special reports and periodic releases. These are given the widest possible distribution so as to make data available quickly.

Releases fall into two categories: one category deals with current material and the other covers postwar prospectives. Each group is in turn subdivided according to its relation to foreign and domestic trade. Some releases are prepared by Bureau analysts who specialize in packaging materials including wood, fibreboard, paper, plastics, glass and metals; others are the work of experts on containers and techniques of packaging for shipment. Still others are written by specialists in machinery and motive power transportation.

Among the periodic releases of the Bureau are:

Domestic Commerce—Issued monthly at an annual subscription rate of $1.00

Foreign Commerce Weekly—Annual subscription $6.00

Survey of Current Business—Annual subscription rate for 12 issues, $2.00

News Letters—Issued by the various field offices of the Department of Commerce.

Modern Ship Stowage—A manual which describes the basic principles of stowing sea-borne cargoes. $1.50.

Markets after the War—Studies to assist market analysts to determine the postwar possibilities for semi-durable and durable goods.

Foreign Trade after the War—"Guestimates" as to the export and import flow of goods assuming that our domestic economy will function at indicated levels.

The National Bureau of Standards is one of the principal research laboratories for the Government, both Federal and State, and under certain conditions and subject to reasonable fees, the general public. In connection with its work on standards of measurement, the Bureau assists in size standardization of containers and products.

The following reports by this bureau are of particular interest to the packaging industry:

Grocers' Paper Bags (R42–5c)

Salt Packages (R70–10c)

Ice-cream Brick Molds and Cartons (R120–5c)

Paper Boxes Used by Department and Specialty Stores (R126–5c)

Notion and Millinery Paper Bags (R129–5c)

Corrugated and Solid Fiber Boxes for Canned Fruits and Vegetables (R146-5c)

Cans for Fruits and Vegetables (names, dimensions, capacities use (R155–5c)

Heavy-duty, Round, Nesting, Paper, Food, and Beverage Containers and Lids (R175–5c)

Packaging of First-aid Unit Dressings and Treatments (R178–5c)

Packages for Shortening, Salad Oil and Cooking Oil (R193–5c)

Glass Containers for Green Olives and Maraschino Cherries—capacities, dimensions, packaging R196– and R197 5c each)

Any or all of the publications listed herein can be obtained from the Superintedent of Documents, Government Printing Office, Washington 25, D. C., or from any of the Field Offices of the Department.

Food, drug and cosmetic act

During the six years since the passage of the Federal Food, Drug and Cosmetic Act in its present form, the ever-expanding list of packaged products coming under its jurisdiction has emphasized its major role in safeguarding health and in protecting the consumer against packaging which is deceptive as to size or as to labeling information. Scarcely less important has been its function of protecting the legitimate operator from the unfair competition which can result from misleading packaging. This most important, most drastic and broadest of all laws affecting packaging concerns, in some degree, approximately 70 to 80 per cent of all packages on the market.

Though war conditions have removed the spotlight from the Food and Drug Administration whose task it is to enforce the Act, new problems have been added not only in the form of slick racketeering schemes but also as a result of various aspects of the manpower shortage. For example, some products, adequately packaged for protection under ordinary conditions, have, after leaving the producers' hands, spoiled due to improper wartime storage. The FDA, in tracking down and eliminating such evils, has received excellent cooperation from producers of branded packaged merchandise.

The 1938 Food, Drug and Cosmetic Act is the most recent of a series of Federal enactments which began in 1890 with the passage of a law prohibiting the importation into the United States of any sorts of adulterated or unwholesome foods, drugs or liquors. Successor to the 1890 legislation was the Wiley Act of 1906. First draft of the present law was submitted to Congress in 1933 and, after several revisions and the recording of thousands of pages of testimony, it was passed and signed by the President on June 24, 1938. There were postponements of several of its provisions, but, by July 1, 1940, the bill was fully in effect.

The Food and Drug Administration, formerly in the Department of Agriculture, was transferred to the Federal Security Agency in 1940. The personnel of the Administration was not changed, however, and continuity of the administrative procedure of its operation has been constantly maintained.

The Food, Drug and Cosmetic Act is a very complex document made further complicated by the multiplicity of rulings and regulations issued under it. It is impossible, therefore, in a general description of its provisions, to cover every point that may arise in the repackaging of any given product. The following sections, however, discuss the more general applications of the Act with regard to packaging.

Packagers are advised to consult with the local offices of the Food and Drug Administration or with their attorneys before entering into the production of any package, package part or label which might come under the regulation imposed by the Act.

Packaging provisions

Packaging provisions of the Act differ slightly in their application to foods, drugs and cosmetics. All three categories of products are covered by a provision against packaging under insanitary conditions which may lead to contamination with filth or may render the product injurious to health. All three categories likewise are covered by a provision against the use of containers composed, in whole or in part, of any poisonous or deleterious substance which may render the contents injurious to health. Failure to conform to either of these provisions constitutes adulteration of the product so packaged.

Containers for all three categories of products must not be so made, formed or filled as to be misleading. Products in such containers are subject to the Act's penalties for misbranding. As an indication of the types of containers falling under this provision, the Chief of the Eastern District of the Food and Drug Administration provided the following list of factors contributing to deceptive packages:

1. Glass Bottles
   a) Thick glass
   b) Panels
   c) Excessive height
   d) Indented bottoms
   e) Irregular shapes
   f) Magnifying shapes
2. Opal Jars
   Same as 1; also raised covers
3. Cardboard, Fibre and Metal Containers
   a) Excessive size (slack-filled)
   b) False bottom
   c) Indented bottom
   d) Raised covers
4. All Types of Containers
   Oversize cartons
5. Facing
6. Deceptive Colored Wrapping
7. Excessive Wrappings
8. False Packing

In any particular instance, it is a question of fact whether or not a container is deceptive, and no iron-clad rules can be laid down. A number of rules or formulas have been proposed to assure compliance with the provisions of the Act covering misleading containers. Best known of these is the so-called Bristol formula for the manufacture of cartons in reduced sizes which more nearly fit tubes of tooth paste.

Manufacturers who pack odd-shaped bottles in cartons have been confronted with the possibility of falling under the deceptive packaging provision because the carton fill

often falls as low as 25 per cent. Where the bottle itself is not deceptive, some manufacturers have recently endeavored to correct possible deception in the packages by printing a facsimile of the bottle label on outside of the carton. In the absence of court interpretation, the Administration has not objected to this, provided it is done in such a way as to show the exact size of the bottle.

Bottle shape and color specifications

Another formula, developed by the State of North Dakota in the enforcement of the State Food and Drug Act, is used for determining whether bottles are deceptive. The formula is intended to contrast the true capacity with the apparent capacity, since bottles made of thick glass or with panels sunk in the sides or bottoms, or bottles having odd shapes or long necks, appear to the purchaser to have a greater capacity than they actually are found to possess.

North Dakota declared as normal, glass containers appearing 1½ times their capacity. That is, if the external volume of the bottles plus the volume of any panels or outside indentation is not more than 1½ times the capacity of the bottle, then the containers are considered to be normal. This same rule has been applied also to 2- and 4-oz. glass bottles.

The Food and Drug Administration has instigated considerable investigation on bottles of larger size which would indicate that the ratio of apparent size to actual capacity becomes progressively less as the size of the container increases.

The heights of bottles set forth below are overall heights and represent the distance from the extreme top of the bottle (no stopper) to the bottom by outside measurement. The Food and Drug Administrator has tentatively accepted these heights as satisfactory for the various sizes and the figures may be regarded as the respective maximum permissible heights:

CAPACITY	HEIGHT	CAPACITY	HEIGHT
oz.	*in.*	*oz.*	*in.*
½	$3\frac{13}{32}$	2	$4\frac{29}{32}$
¾	$3\frac{21}{32}$	3	$5\frac{5}{16}$
1	$4\frac{1}{32}$		
1½	$4\frac{15}{32}$	4	$5\frac{29}{32}$

Of course, bottles meeting these requirements as to height may be deceptive for other reasons, as, for example, irregular shape, undue thickness of glass, indented bottoms and panels.

Many types of deception cannot be covered by formula —or have not to date been covered by formula. The shape of an article may throw the package into the deceptive class as, for instance, in the case of chocolate bars which have been excessively thinned out to provide an extremely large ratio of package face to its weight. Deception due to colored wrapping results from the use of transparent colored materials—the use of an orange transparent film to wrap partially smoked fish is an example of such deception. This is interpreted as having the effect of giving the fish a rich color and, hence, the appearance (the deceptive appearance) of being fully smoked.

Powdered products

Manufacturers have had much difficulty with products which settle after packing, such as spices, talcum powder, tooth powder, and the like. A method of measuring the package content of spices, and a minimum content requirement based on the capacity of the container, have been worked out by the American Spice Trade Association. The same requirements are applicable to talcum powder, tooth powder, tea and free-flowing macaroni products, and may later be found to apply to other types of packaged materials.

This method provides an informal guiding figure which, if met or exceeded, would in the opinion of the Administration constitute a satisfactorily filled package for the products indicated. To meet the requirement, the maximum and minimum volumes occupied by two ounces (avoirdupois) are determined by the following so-called "Spice Method:"

To Determine Maximum Volume—Roll two ounces of the spice back and forth on a sheet of paper 10 times, fill into a 250-cc. graduated cylinder and note the volume.

To Determine Minimum Volume—Vigorously tap the 250-cc. cylinder 100 times and read volume; tap 20 times and again read volume; continue till 20 taps reduce the volume less than 1 cc. and note the final volume. To obtain the proper minimum volume where cosmetic powders are concerned, it is necessary to pound the cylinder vigorously rather than tap it.

The average volume for any given weight of spice is obtained by direct proportion, using the average of the maximum and minimum volumes of two ounces obtained as indicated above. The per cent of fill is calculated from the average volume occupied by the spice and from the capacity of the container; for example, if the average volume occupied by the spice is 90 cc. and the container has a capacity of 100 cc., then the per cent of fill is 90 per cent.

Provisions affecting labeling

The terms "label" and "labeling" are not used synonymously in the Act. The term "label" is defined as a display of written, printed or graphic matter upon the immediate container of any article and a requirement that any word, statement or other information appearing on the label shall not be considered to be complied with unless it also appears on the outside container or wrapper of the retail package of such article or is easily legible through the outside container or wrapper. The term "labeling" means all labels and other written, printed or graphic matter upon any article or any of its containers or wrappers or accompanying such article. (See *Labels, Seals, Tags and Marking Pieces*, p. 300.)

Food-labeling provisions

The food-labeling provisions of the Act fall into 12 rules—2 in the form of prohibitions and 10 in the form of affirmative requirements:



OFFICIALS ADMINISTERING FEDERAL AND STATE REGULATIONS

THE FEDERAL FOOD, DRUG AND COSMETIC ACT

ADMINISTRATOR OF THE FEDERAL SECURITY AGENCY
Paul V. McNutt

Food and Drug Administration

Commissioner of Food and Drugs: P. B. Dunbar
Assistant Commissioner: C. W. Crawford
Assistant to the Commissioner: F. Munchmeyer
Chief Inspector: G. P. Larrick
Interstate Division: L. D. Elliott
Division of State Cooperation: W. A. Queen
Drug Division: R. P. Herwick
Food Division: W. B. White
Microanalytical Division: H. Welch
Division of Pharmacology: H. O. Calvery
Vitamin Division: E. M. Nelson
Bacteriology Division: A. C. Hunter
Cosmetic Division: Dan Dahle

FIELD SERVICE

Eastern District

Headquarters: 1200, U. S. Appraiser's Stores, 201 Varick Street, New York, N. Y.; W. R. M. Wharton, Chief
Atlanta, Ga.: 416, Federal Annex; J. J. McManus
Baltimore, Md.: 800, U. S. Appraiser's Stores, Gay and Lombard Streets; A. T. Retzlaff
Boston, Mass.: 805, U. S. Appraiser's Stores, 408 Atlantic Avenue; H. D. Garrett
Buffalo, N. Y.: 415, Federal Bldg., S. Division and Ellicott Streets; W. H. Heath
Charlotte, N. C.: 233, U. S. Post Office Bldg.; S. T. Grey, resident inspector
Charleston, W. Va.: 342, State Capitol Bldg.; J. H. Guill, resident inspector
Jacksonville, Fla.: 334, U. S. Court House Bldg.; G. R. Fowler, resident inspector
Newark, N. J. (substation): Room 899 Post Office Bldg.; M. S. Fisher
New York, N. Y.: 1200, U. S. Appraiser's Stores, 201 Varick Street; McKay McKinnon, Jr., Chief of Station
Norfolk, Va. 289, Brokers' Exchange Bldg., 264 W. Tazewell Street; W. B. Rankin, resident inspector
Philadelphia, Pa.: 1204, New Custom House, 2nd and Chestnut Streets; C. S. Brinton
Pittsburgh, Pa. (substation): 303, Old Post Office Bldg.; D. F. Fisher
Providence, R. I.: 209 Main Post Office Bldg.; A. E. Ledder, resident inspector
Tampa, Fla.: 117, U. S. Appraiser's Stores, Platt and Water Streets; M. O. Rentz, resident inspector
Waterbury, Conn.: 207, Post Office Bldg.; J. A. Kedzior, resident inspector

Central District

Headquarters: 1222, Post Office Bldg., Van Buren and Canal Streets, Chicago, Ill.; J. O. Clarke, Chief
Chicago, Ill.: 1222, Post Office Bldg., Van Buren and Canal Streets; M. R. Stephens, Chief of Station
Cincinnati, Ohio: 501, Post Office Bldg.; S. A. Postle
Cleveland, Ohio: 2, New Post Office; K. R. Lennington, resident inspector
Dallas, Tex.: 557, Terminal Annex; L. Johnson, resident inspector
Detroit, Mich.: Room 311, Custom House, 100 W. Larned St.; G. W. Sooy, resident inspector
Houston, Tex. (substation): 1018, Federal Office Bldg.; M. Harris
Kansas City, Mo.: 323, U. S. Court House, 811 Grand Avenue;
Memphis, Tenn.: 326, U. S. Custom House; B. T. Melvin, Jr., resident inspector
Milwaukee, Wis.: Room 361, Federal Bldg., W. K. Hays, resident inspector
Minneapolis, Minn.: 209, Federal Office Bldg., Washington and Third Avenues, South; C. T. Hubble, Acting Chief
New Orleans, La.: 223, U. S. Custom House, 423 Canal Street; E. C. Boudreaux
Omaha, Nebr.: Room 801, Omaha Loan & Bldg., Assn. Bldg, 15th and Dodge Streets; E. A. Reed, resident inspector
St. Louis, Mo.: 1007, New Federal Bldg., 1114 Market Street; R. S. Pruitt
San Antonio, Texas.: P. O. Box 2076 W. R. Moses; resident inspector.

Western District

Headquarters: 502, Federal Office Bldg., Fulton and Leavenworth Streets, San Francisco, Calif.; J. L. Harvey, Chief
Denver, Col.: 531, U. S. Custom House; W. Vincent
Los Angeles, Calif.: 1401 S. Hope Street; R. S. Roe
Lubbock, Tex.: Room 304, P. O. Bldg., H. W. Ayres, resident inspector
Phoenix, Ariz.: Room 704, Security Bldg., M. P. Kerr, resident inspector
Portland, Ore. (substation): 315, U. S. Custom House; Richard Edge
Salt Lake City, Utah: 430, Post Office Bldg.; A. N. Morton, resident inspector
San Francisco, Calif.: 502, Federal Office Bldg., Fulton and Leavenworth Streets; A. J. Brown, Chief of Station
Seattle, Wash.: 501, Federal Office Bldg.; K. E. Monfore
Spokane, Wash.: 321, Federal Bldg.; F. L. Lofsvold resident inspector

OFFICIALS ADMINISTERING STATE REGULATORY LEGISLATION

Alabama:—Commissioner, Department of Agriculture and Industries, Montgomery.

Arizona:—Director, Division of Laboratories, Phoenix. State Dairy Commissioner, Phoenix. Secretary of State, Phoenix. Board of Health, Phoenix.

Arkansas:—State Health Officer, Little Rock. Secretary, State Board of Pharmacy, Ozark.

California:—Chief, Bureau of Food & Drug Inspection, State Department of Public Health, San Francisco. Chief, Bureau of Dairy Service, Division of Animal Industry, State Department of Agriculture, Sacramento.

Colorado:—Food & Drug Commissioner, State Department of Health, Denver. State Dairy Commissioner, Denver. State Director of Agriculture, Denver.

Connecticut:—State Dairy & Food Commissioner, Hartford. Director, Connecticut Agricultural Experiment Station, New Haven.

Delaware:—Executive Secretary, Board of Health, Dover. Chemist, State Board of Agriculture, Dover.

District of Columbia:—Health Officer, Washington, D. C.

Florida:—Commissioner of Agriculture, Tallahassee. State Chemist, Tallahassee.

Georgia:—Commissioner of Agriculture, Atlanta. State Chemist, Atlanta. Chief Food Inspector, Atlanta. Chief Drug Inspector, Atlanta.

Hawaii:—Food Commissioner and Analyst, Territory of Hawaii.

Idaho:—Director of Public Health, Boise. State Chemist, Boise.

Illinois:—Director of Agriculture, Springfield. Liquors: Department of Finance, Springfield. Milk: Board of Health, Springfield.

Indiana:—Director of Food & Drug Bureau, State Board of Health, Indianapolis. Chief, Bureau of Dairy Products, State Board of Health, Indianapolis. Chief, Bureau of Weights and Measures, State Department of Commerce & Industries, Indianapolis.

Iowa:—Secretary of Agriculture, Des Moines. Chief, Dairy and Food Division, Department of Agriculture, Des Moines.

Kansas:—Secretary, State Board of Health, Topeka. Chief Food & Drug Inspector, State Board of Health, Topeka.

Kentucky:—Director, Bureau of Foods, Drugs & Hotels, State Department of Health, Louisville.

Louisiana:—President, State Department of Health, New Orleans. Head, Food & Drug Section, State Board of Health, New Orleans.

Maine:—Chief, Division of Inspection, Department of Agriculture, Augusta.

Maryland:—State Food & Drug Commissioner, Baltimore. Deputy Commissioner, State Department of Health, Baltimore.

Massachusetts:—Director, Department of Food & Drugs, Department of Public Health, State House, Boston. Director, Division of Standards and Necessities of Life, State House, Boston.

Michigan:—Director, Bureau of Foods & Dairy Inspection Department of Agriculture, Lansing. Director, Bureau of Dairying, Department of Agriculture, Lansing. State Analyst, Department of Agriculture, Lansing. Director of Drugs & Drug Stores, State Board of Pharmacy, Lansing. Director, Bureau of Fruit & Vegetable Inspection, Department of Agriculture, Lansing.

Minnesota:—Commissioner, Department of Agriculture, Dairy & Food, St. Paul. Chief Bacteriologist, Department of Agriculture, St. Paul. Chief Chemist, Department of Agriculture, St. Paul.

Mississippi:—Commissioner of Agriculture and Commerce, Jackson. State Chemist, State College.

Missouri:—State Health Commissioner (Food & Drug Laws), Jefferson City. Commissioner of Agriculture (Dairy, Ice Cream, Feed, Egg Laws), Jefferson City.

Montana:—Director of Foods & Drugs, Department of Public Health, Helena. Dairy Division, Department of Agriculture, Labor & Industry, Helena.

Nebraska:—Director, Department of Agriculture and Inspection, Lincoln. Chief, Dairy & Foods Division, Lincoln.

Nevada:—State Food & Drug Commissioner, Reno.

New Hampshire:—Director, Division of Chemistry & Sanitation, State Department of Health, Concord. Commissioner, Weights & Measures, Concord.

New Jersey:—Chief, Bureau of Foods & Drugs, State Department of Health, Trenton. Chief, Bureau of Chemistry, State Department of Health, Trenton.

New Mexico:—Director of Public Health, Santa Fe. State Dairy Commissioner, State College.

New York:—Commissioner, Department of Agriculture & Markets, Albany. Director, State Food Laboratory, Albany. Secretary, State Board of Pharmacy, State Education Building, Albany.

North Carolina:—Commissioner of Agriculture, Raleigh. State Chemist, Department of Agriculture, Raleigh.

North Dakota:—State Food Commissioner & Chemist, Bismarck. State Dairy Commissioner, Bismarck.

Ohio:—Director, Department of Agriculture, Columbus 15. Chief, Division of Foods & Dairies, Department of Agriculture, Columbus 15.

Oklahoma:—State Commissioner of Health, Oklahoma City.

Oregon:—Director, Department of Agriculture, Salem. Chief, Division of Foods & Dairies and Weights & Measures. Chief Chemist, Department of Agriculture, Salem.

Pennsylvania:—Director, Bureau of Foods & Chemistry, Department of Agriculture, Harrisburg. Secretary, State Board of Pharmacy, Harrisburg.

Rhode Island:—Chief Inspector, Division of Food & Drugs, Department of Health, Providence.

South Carolina:—Commissioner of Agriculture, Columbia.

South Dakota:—Secretary, Dept. of Agriculture, Pierre. State Chemist, Vermillion.

Tennessee:—Commissioner of Agriculture, Nashville. Superintendent, Division of Foods, Fertilizers, Dairies, Department of Agriculture, Nashville.

Texas:—Director, Food & Drug Bureau, State Board of Health, Austin. Department of Agriculture, Austin.

Utah:—State Department of Agriculture, Salt Lake City.

Vermont:—Secretary, State Department of Public Health, Burlington.

Virginia:—Commissioner of Agriculture & Immigration, Richmond. Director, Dairy & Food Division, Department of Agriculture & Immigration, Richmond. Chief Chemist, Department of Agriculture & Immigration, Richmond. Secretary, State Board of Pharmacy, Richmond. Director, Division of Markets, Department of Agriculture & Immigration, Richmond.

Washington:—Supervisor, Food & Drug Division, State Department of Agriculture, Olympia. State Board of Pharmacy, Olympia.

West Virginia:—Commissioner of Health (Foods and Drugs), Charleston. Commissioner of Agriculture (Foods), Charleston.

Wisconsin:—Director, State Department of Agriculture, Madison. Chief, Dairy Division, State Department of Agriculture, Madison. Supervisor of Food & Drug Inspection, State Department of Agriculture, Madison. Chief Inspector of Weights and Measures, State Department of Agriculture, Madison.

Wyoming:—Acting Commissioner, Department of Agriculture, Cheyenne. State Chemist, Laramie.

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XUM

1. The labeling of a food must not be false or misleading in any particular.
2. A food must not be offered for sale under the name of another food.
3. The label of a food which is an imitation of another food must bear, in type of uniform size and prominence, the word "imitation" and, immediately thereafter, the name of the food which is imitated.
4. A food in package form must bear a label containing the name and place of business of the manufacturer, packer or distributor.
5. A food in package form must bear a label containing an accurate statement of the quantity of the contents in terms of weight, measure or numerical count. Reasonable variations shall be permitted and exemptions as to small packages shall be established by regulations.
6. If a food purports to be or is represented as a food for which a definition and a standard of identity have been prescribed by regulations, its label must bear the name of the food specified in the definition and standard and, in so far as may be required by such regulations, the common names of optional ingredients (other than spices, flavoring and coloring) present in such food.
7. If a food purports to be or is represented as a food for which a standard of quality has been prescribed by regulations and its quality falls below such standards, its label must bear, in such manner and form as the regulations specify, a statement that it falls below standard.
8. If a food purports to be or is represented as a food for which a standard or standards of fill of container have been prescribed by regulations and it falls below the standard of fill of container applicable thereto, its label must bear, in such manner and form as the regulations specify, a statement that it falls below standard.
9. A food which does not purport to be one for which a definition and a standard of identity have been prescribed by regulations must bear on its label the common or usual name of the food, if any there be and, in case it is fabricated from two or more ingredients, the common or usual name of each such ingredient. Spices, flavorings and colorings, other than those sold as such, may be designated without naming each. Exemptions may be established by regulations to the extent that naming of the ingredients is impracticable.
10. If a food purports to be or is represented for special dietary uses, its label must bear such information concerning its vitamin, mineral and other dietary properties as the administrator determines, and by regulations prescribed as necessary in order fully to inform purchasers as to its value for such uses.
11. If a food bears or contains any artificial flavoring, artificial coloring or chemical preservative, it must bear labeling stating that fact. To the extent that compliance with this requirement is impracticable, exemptions shall be established by regulations. The requirements with respects to artificial coloring do not apply in the case of butter, cheese or ice cream.
12. Any word, statement or other information required by the Act to appear on the label or labeling must be prominently placed thereon with such conspicuousness (as compared with other words, statements, designs or devices in the labeling) and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use.

Drug-labeling provisions

The provisions relating to labeling of drugs and devices fall within 14 rules, four constituting prohibitions and ten constituting affirmative requirements:

1. The labeling of a drug or device must not be false or misleading in any particular.
2. A drug must not be an imitation of another drug.
3. A drug must not be offered for sale under the name of another drug.
4. A drug or device must not be dangerous to health when used in the dosage or with the frequency or duration prescribed, recommended or suggested in the labeling thereof.
5. A drug or device in package form must bear a label containing the name and place of business of the manufacturer, packer or distributor.
6. A drug or device in package form must bear a label containing an accurate statement of the quantity of the contents in terms of weight, measure or numerical count. Reasonable variations shall be permitted and exemptions as to small packages shall be established by the proper regulations.
7. A drug which is for use by man and contains any quantity of the narcotic or hypnotic substances named must bear on its label the name, and quantity or proportion of such substance or derivative and in juxtaposition therewith the statement, "Warning—May be habit forming." The named substances are alpha-eucaine, barbituric acid, beta-eucaine, bromal, cannabis, carbromal, chloral, coca, cocaine, codeine, heroin, marihuana, morphine, opium, paraldehyde, peyote, sulphonmethane and any chemical derivative of any such substance which derivative has been designated by regulations as habit forming.
8. The label of a drug which is not designated solely by a name recognized in an official compendium must bear the common or usual name of the drug, if such there be, and in case it is fabricated from two or more ingredients, the common or usual name of each active ingredient, including the quantity, kind and proportion of any alcohol and also including whether active or not, the name and quantity or proportion of any bromides, ether, chloroform, acetanilid, acetophenetidin, amidopyrine, antipyrine, atropine, hyoscine, hyoscyamine, arsenic, digitalis glucoside, mercury, ouabain, strophanthin, strychnine, thyroid or any derivative or preparation of

any such substance contained therein. To the extent that compliance with requirements is impracticable, exemptions shall be established.

9. The labeling of a drug or device must bear adequate directions for use, provided that where the requirement as applied to any drug or device is not necessary for the protection of public health, the administrator shall promulgate regulations exempting such item from such requirement.
10. The labeling of a drug or device must bear such adequate warnings against use in those pathological conditions or by children where its use may be dangerous to health, and against unsafe dosage or methods or duration of administration or application, in such manner and form, as are necessary for the protection of users.
11. If a drug purports to be a drug the name of which is recognized in an official compendium, it must be packaged and labeled as prescribed therein, provided that the method of packing may be modified with consent of the Administrator. Whenever a drug is recognized in both the *U. S. Pharmacopoeia* and the *Homeopathic Pharmacopeia of the United States,* it is subject to the requirements of the *U. S. Pharmacopoeia* with respect to labeling unless it is labeled and offered for sale as a homeopathic drug, in which case it is subject to the provisions of the *Homeopathic Pharmacopoeia of the United States* and not to those of the *U. S. Pharmacopoeia.*
12. The label of a drug which has been found by the Administrator to be liable to deterioration must bear a statement of such precautions as regulations require as necessary for the protection of the public health.
13. A drug which purports to be or is represented as a drug the name of which is recognized in an official compendium, if its strength differs from, or its quality or purity falls below, the standard set forth in such compendium, must plainly state on its label its difference in strength, quality or purity from such standard.
14. Any word, statement or other information required to appear on the label or labeling must be prominently placed thereon with such conspicuousness (as compared with other words, statements, designs or devices in the labeling) and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use.

Cosmetic-labeling provisions

Cosmetic-labeling provisions fall within five rules:

1. The labeling of a cosmetic must not be false or misleading in any particular.
2. A coal-tar hair dye which may be injurious to consumers under the conditions of use prescribed in the labeling or under such conditions of use as are usual must bear the following conspicuously:

   Caution: This product contains ingredients which may cause skin irritations on certain individuals and a preliminary test according to accompanying directions should first be made. This product must not be used for dyeing the eyelashes or eyebrows; to do so may cause blindness.

   The labeling of such hair dye must bear adequate directions for such preliminary testing.
3. A cosmetic in package form must bear a label containing the name and place of business of the manufacturer, packer or distributor.
4. A cosmetic in package form must bear a label containing an accurate statement of the quantity of the contents in terms of weight, measure or numerical count. Reasonable variations shall be permitted and exemptions as to small packages shall be established by regulations.
5. Any word, statement or other information required to appear on the label or labeling must be prominently placed thereon with such conspicuousness (as compared with other words, statements, designs or devices in the labeling) and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use.

An exemption from certain labeling requirements of the Act is provided for cosmetics which are to be processed, labeled or repacked in substantial quantities at establishments other than those where originally processed or packed, provided that such cosmetics are not adulterated or misbranded upon removal from such processing, labeling or repacking establishments. A similar exemption applies to drugs and foods. Small open containers of fresh fruits and fresh vegetables are also exempted by regulations from certain of the Federal labeling requirements.

Labeling coal-tar products

Labeling requirements for certified coal-tar colors are found partly in the Food, Drug and Cosmetic Act, partly in regulations for coal-tar colors. Labels for all such products should carry:

1. An accurate statement of the net contents of the package, except certain small packages specifically exempted under secs. 403 (e), 502 (b) and 602 (b) of the Act
2. The name and place of business of the manufacturer, packer or distributor
3. In the case of mixtures for use in food, the names of the component colors and of each diluent contained in the mixture, and indication if they bear "Certified Coal-Tar Color" or "Certified Coal-Tar Colors"; and the common name of each diluent therein
4. The name of the color
5. The lot number of the batch
6. The pure dye content of the color
7. In the case of a color certified for a limited use, a statement setting forth this limitation

Certain small packages of certified coal-tar colors are exempt from label requirements which are relative to their net contents.

Adulteration

Numerous provisions in the law apply to adulteration of foods, drugs and cosmetics. In most cases these provisions do not affect the packaging operations or the packages themselves, except in so far as the penalty for adulteration involves a confiscation and seizure of packaged products. However, the provisions of the law applying to preparation or holding of foods, drugs or cosmetics under insanitary conditions obviously apply to packaging as well as to processing conditions.

Enforcement

The Food and Drug Administration is armed with numerous powers to secure the enforcement of provisions and prohibitions contained in the Act. Violation of the prohibited acts, such as the introduction into interstate commerce of adulterated or misbranded foods, drugs or cosmetics is made a misdemeanor under the law. The penalty for such violation is imprisonment for not more than one year or a fine of not more than $1,000 or both. Second offenders are liable to imprisonment for not more than three years or a fine of not more than $10,000. Where intent to defraud or mislead is found, a penalty of three years imprisonment or $10,000 fine or both may be imposed. These criminal provisions, while constituting a big stick behind the door, are perhaps the least utilized of the enforcement procedures provided by the Act. The Administration is empowered to proceed against merchandise as well as against persons. Articles that are adulterated or misbranded and introduced into interstate commerce are liable to seizure by the Administration and, if found by the courts to be adulterated or misbranded, may be disposed of by destruction or sale.

Such drastic proceedings are not, however, undertaken in most cases. The law provides that nothing in the Act shall be construed as requiring the Administration to report for prosecution or to institute libel or injunction proceedings where minor violations of the Act are concerned, provided the Administration believes that the public interest will be adequately served by a suitable written notice or warning.

Far more important to the average manufacturer than the criminal provisions or the seizure and trial provisions of the Act is the fact that failure to conform to the packaging and labeling provisions and consequent action by the Administration may involve the manufacturer in a whole series of extremely expensive package changes and may involve the loss of dealer good will, adverse publicity and a dislocation of production and shipments.

Because of these economic consequences—quite as much as because of the punitive provisions of the law—manufacturers in general should make every effort to ensure, in advance, that they achieve a satisfactory degree of compliance with every provision of the Act. To date, the Administration has proceeded only in the more flagrant cases of violation.

State and local laws

The state legislatures, through their inherent police power as well as through their Constitutional powers involving the protection of public health and the like, have undoubted rights to pass legislation to protect the public against adulterated and misbranded foods, drugs and cosmetics. The validity of state laws is in no way affected by Federal laws, except where the former are conflicting.

The nature of state statutes differs considerably in the various states. At least 39 states have laws relating specifically to packaging, labeling, adulterating, or misbranding. Several of these have adopted the Federal Food, Drug, and Cosmetic Act of 1938 in its entirety, among them: California, Connecticut, Delaware, Louisiana, New Jersey, North Carolina, Oklahoma, Oregon, Tennessee, Utah, Vermont, and the Territory of Hawaii. Several other states have separate laws for foods and/or drugs and cosmetics, and some have special statutes covering dairy products: Arizona, Alabama, Arkansas, Colorado, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Mexico, New York, North Dakota, Rhode Island, South Dakota, and Virginia.

Special state laws

A few have special laws or regulations on container packages, labels, weights and measures: Arizona, Delaware, Florida, Illinois, Iowa, Kansas (newly revised), Maine, Massachusetts, Montana, New Jersey (new beverage-container law), North Carolina, Ohio, Pennsylvania, South Dakota, Texas, Washington, Virginia, West Virginia, and Wisconsin.

Oregon and Texas now have laws which affect packaging of insecticides and fungicides, and the latter state also has a law prescribing standard package sizes for flour, cereal, etc.

To aid federal laws

Usually, state laws and local ordinances are designed principally to cover products manufactured within the state and sold only within the state (i.e., products outside the reach of the Federal authorities), although they apply equally to foods, drugs or cosmetics *sold* within the state whether or not (in most instances) the product is manufactured within that state. Thus manufacturers are obliged, in planning new packages, to consider the effect upon package design, label and structure not only of the Federal statute, but of the laws of the states in which the product is to be sold.

Check on state laws

Wherever the market in a given state promises sizable present or potential sales outlet, the manufacturer will be well advised to check the state law and to attempt to make his package conform with state law requirements which may be more stringent or more restrictive than the Federal law. State requirements cannot relax Federal restrictions in any respect since the latter prevail throughout the United States.

Package and trademark protection

Recognition of ownership in package developments is manifested by legal protection afforded it. Under the guidance of a competent attorney the manufacturer introducing a new package may be reasonably secure from poachers. All concerned with protecting package developments are urged to obtain expert advice in foreign as well as in domestic requirements.

It is interesting to note that package developments such as construction and design have taken their places among "new and useful inventions" and are patentable. Package construction patents are issued by the United States Patent Office for a term of 17 years with renewal provisions, while a design patent may be secured for terms of 3½, 7, or 14 years, at varying fees. Federal law also provides for ownership of trademark or brand name. In the United States, ownership of trademark or brand name is based upon priority of use, regardless of whether or not the first user has registered the identification in the United States Patent Office. This principle also holds in British law. Other countries—notably South and Central America—base their trademark protection on priority of registration. Some countries make the registration of trademarks mandatory.

Most of our individual states have trademark statutes providing for state registration, but up to the present, none of these state laws make registration mandatory. In several instances, when such mandatory legislation was pending, *Printer's Ink* crusaded successfully against its passage. Instances are Nevada, New York, Maryland, New Jersey, Rhode Island, Kentucky and New Mexico. In the opinion of many merchandisers, these state laws are an unnecessary barrier that interferes with the free movement of packaged goods in interstate commerce. It is claimed by those who protest against these laws that they spring from two sources: (1) state legislatures that find it difficult to resist the revenue opportunity, and (2) trademark consultants who thrive on the legal practice involved in obtaining state registration. Interesting in this connection is the fact that the Association of State Secretaries of State has passed resolutions condemning such law. Whatever the merits of the case, the fact remains that these state laws are in force.

Trademarks

A trademark protects the name or symbol under which an article of merchandise is sold. The United States Patent Office provides facilities for registration of trademarks—that is, names or symbols or a combination of both—used by the manufacturer to identify a particular product. This protection applies only to articles used in interstate or foreign commerce. The mark must be one which is still available for use as determined by having a search conducted through the registered and published marks in the Trade Mark Division, United States Patent Office.

There are many cases of trademarks in use by manufacturers who have secured neither Federal nor state registration of the mark. In this event, the manufacturer who seeks to register his mark can ascertain only whether or not such an unregistered mark is in use by his own observations in the particular field or by consulting with experts in that field.

In this connection, it should also be borne in mind that even if the Patent Office considered the mark registrable and passes it to publication, any persons, firms, etc., who may deem themselves injured by the granting of the registration, may file an opposition, whereupon evidence may be presented and a decision rendered by the proper tribunals of the Patent Office.

Even after a registration has been passed to issue by the Patent Office, and the registration has been issued, a petition for cancellation may be filed by any persons, firms, etc., who may deem themselves injured by the registration, and procedure similar to that in filing oppositions is then to be followed.

Many manufacturers and laymen believe that once they secure a Federal Trade Mark Registration, their rights are fully protected and no further action need be taken. However, the Government, of its own initiative, will take no steps to halt an infringer of a patent or trademark. It is incumbent upon the owner of the infringed patent or trademark to bring suit in Federal Court.

Copyright registration

Labels, cartons designs, displays, etc., may be copyrighted provided they are artistic creations used in the sale of goods. Such copyrights are for a period of 28 years and may be renewed for 28 years, and must be originally published with notice of copyright. A label or print is considered published when it has been printed ready for use.

A label must be something attached to the goods, as by pasting onto the container. Cartons, cans, wrappers, etc., are classed in this category and may be registered in their entirety when submitted in flat form. A print cannot be attached to the goods, but must be used to advertise them; advertisements in magazines, street car cards, displays, etc., make up this group. Copyright gives the owner the right to sue directly in Federal courts to obtain damages fixed by law.

There are instances, also, in which prints, pictorial illustrations, pamphlets, etc., may be copyrighted in the Copyright Division of the Library of Congress. But this type of copyright, though more economical, must not be confused with the Patent Office copyright.

To secure copyright register, the user first applies a copyright notice to the object to be covered by copyright. Application for the copyright is then made to the Patent Office.

Package and trademark trespassing

by L. W. Mida

Difficulties which arise from violation of trademark or design rights may often be caused by ignorance of the laws or by misinterpretation of them. Whereas "ignorance of the law is no excuse" for trespassing, it is quite conceivable that interpretation may vary. A manufacturer introducing a new package may be convinced that there is a "reasonable" difference between his trademark or design and that of his competitor, but the latter may not agree.

Usually common sense may be relied upon in attempting to avoid trouble of this sort. Now and then, however, borderline cases occur when it is difficult to judge what is permissible or what constitutes "unfair competition." Precedents established in court decisions may be studied for guidance in cases of doubt. Some examples of court decisions are included in this article for the convenience of those concerned. These examples are not offered in a didactic spirit, but rather to serve as broad indications for making parallel deductions.

The title "package" comprehends any container or covering, including wrappers and labels. Invasion of any of these is governed by the same simple underlying principles. The ruling question is whether the average buying public—known to be extremely lax in recalling the exact appearances of anything—is likely to be confused in normal purchasing. Having this one point well in mind and following it literally will save much litigation. A mistake is often made in trying to compromise on minor changes in color schemes and other details which, when examined closely, might seem sufficient. The average person, however, usually does not examine objects closely. The origination of packages in the modern trend has created a fine art of distinctiveness and attractiveness, which offers wide latitude in the avoidance of similarities. Today, there is no valid excuse to cut corners in resemblances. Trade papers have greatly helped manufacturers to overcome the problems of infringement by publishing new patterns in design. This substantial service points directly to the marketing advantages of a package that is outstanding in its entirety, and in itself assures immunity from involvement in any infringements.

While there can be no monopoly of colors as such, the abuse, not the use, of these eye-catching combinations is the seat of much trouble. There is a popular notion that the transposing of color features removes reason for complaint, overlooking the fact that where a dominating color gives exclusiveness to design, there is a property right in such exclusiveness. Virtually every suit on the grounds of "colorable imitation" finds the defendant inviting a court opinion through lack of regard for this basic index.

The benefits of copyright are well recognized. However, manufacturers commonly make the mistake of neglecting to apply for copyright at the legal time. That time is properly upon the first production of the package, wrapper or label, not just any time in later years whenever the spirit moves. To wait until the goods have been on the market for a considerable period before obtaining the copyright certificate might prove a boomerang. If evidence proves non-compliance with the letter of the copyright law, the copyright might be held illegal and vacated in a court test. Such lack of foresight can defeat what might otherwise be an entirely meritorious case of alleged imitation.

Under "unfair competition" may be gathered a multitude of complaints, the most conspicuous and numerous being those that embody trademarks as expressed by brand names. What constitutes trespassing in brand name only can best be illustrated by actual findings. When dealing with the three tests customarily applied—i.e., similarity of sound, appearance and meaning—these opinions usually are soundly rendered. When other distinguishing features are added, such as similarities in the actual package, together with representations made in selling, either in the accompanying literature or by word-of-mouth, the cases become more complex. The more involved the issue, the greater the margin for doubt, unless the complaint is clearly justified to the most casual observer. Where there is a strong element of doubt, the court wisely takes into account the measure of popularity created by the original claimant, and views the infringement in the light of probable damage to that established popularity. This is held to constitute unfair competition in the invested property.

Trademarks held confusingly similar

"PEPTO SELTZER" and "PEPSIMIC SELTZER AMELOTTE": The Pepsodent Co. vs. Pepsimic Seltzer Co. (26, C.C.P.A.-1210, 103F [2d] 362). While "Pepsimic Seltzer Amelotte" is descriptive and is registered under the 1920 Act, the use of descriptive marks may form the basis of an opposition. This is distinguished from the "Alka Seltzer" vs. "Pepso Seltzer" case in that, here, the marks as a whole are confusingly similar.

"MEADOW GOLD" and "OLD MEADOW": Abell vs. Beatrice Creamery Co. (23, C.C.P.A., 735; 79F [2d] 751). The marks, except in the arrangement of the words and the absence of the letter "G" in appellant's mark, are identical; goods the same.

"DOBRY'S SUNSWEET" and "SUNSWEET": California Prune and Apricot Growers Assn. vs. Dobry Flour Mills, Inc. (26, C.C.P.A.-910; 101F [2d] 838). "Sunsweet" in appellee's mark printed in larger type than the word "Dobry's," the words being associated with a representation of the sun, all inclosed within an elaborate border. The Court said: "We have no hesitation in holding that the marks are confusingly similar, and that the appellant has been damaged by the registration of appellee's mark. To hold otherwise would make it possible for one to appropriate a trademark which, through extensive advertising, had become a household word, by adding thereto the name of an individual."

"SOLVEX" and "NO-VEX": Albert I. Falls, doing business as Falls Chemical Company vs. The Scholl Mfg. Co., Inc., (24, C.C.P.A., 1308 (90F [2d] 499). While it appeared that the word "Scholls" was printed on the opposer's labels as a prefix to the word "Solvex," the latter word was the dominant feature of such labels, and some purchasers would call for "Scholl's Solvex," while others would ask simply for "Solvex."

"SUNNY MIST" and "SUNKIST:" Florida Citrus Growers Cooperative vs. California Fruit Growers Exchange (25, C.C.P.A.-963; 95F [2d] 512). Goods of same descriptive properties but specifically different, one being *canned* citrus fruit and juices for food purposes, and the other fresh citrus fruits and by-products. This de-

cision turned on the similarity of sound of the two marks. Further, there was some similarity in appearance in the use of a large "S" in both marks.

"E-Z" and "KLAD-EZEE": E. Z. Mills, Inc., vs. Martin Brothers Co. (25, C.C.P.A., 992-95F [2d] 269). While the marks, tested by appearance alone, are not confusingly similar, a very different impression is made when the sound is compared. That similarity in sound alone is sufficient to constitute confusing similarity between marks is well established.

Trademarks not confusingly similar

"ALKA-SELTZER" and "PEPSO-SELTZER": Miles Laboratories Inc., vs. The Pepsodent Co. (26, C.C.P.A.-1272; 104F [2d] 205). The arbitrary terms "Alka" and "Pepso" are the dominant portions of the respective trademarks. "Seltzer," in each mark, is descriptive and, therefore, public juris, and cannot indicate origin.

"SPIRALATOR" and "ROLLATOR": Borg-Warner Corp. vs. Easy Washing Machine Corp. (26, C.C.P.A., 1256; 104F [2d] 1256). Goods specifically different (refrigerators and washing machines), but Court found it not necessary to determine whether or not they were goods of same descriptive properties, in view of wide difference in marks.

"VAPEX" and "VICKS," or "VAPORUB": Vick Chemical Co. vs. Thomas Kerfoot and Co., Ltd. (23, C.C.P.A.-752; 80F [2d] 73). "Vicks" and "Vapex" have only the initial letter in common and while they terminate with the same sound, they are clearly distinguishable in that one has only one syllable while the other has two. The Court quoted with approval the remarks of the Commissioner of Patents as to the difference between "Vaporub" and "Vapex," as follows: "As between "Vaporub" and "Vapex" the only similarity, either when written or spoken, is the first syllable, "Vap-"; and in view of the obvious differences it is difficult to comprehend how this one syllable in common would confuse."

Cumulative differences in marks and goods

"NEET" and "NEXT": Affiliated Products, Inc., vs. Crazy Water Co. (26, C.C.P.A.-1331; 104F [2d] 366). "Neet" used on depilatories and antiperspirants; "Next" used on shaving cream and shaving, toilet and bath soaps. Differences in marks and goods held cumulative in preventing confusion in trade, but goods held to be of the same descriptive properties. The Court said: "We have no doubt but that the involved marks, even though they may be made up of the same number of letters, and begin and end with the same letters, appear to the ocular sense in a quite different way."

"BUDGET SPECIAL" and "TETLEY'S BUDGET TEA" (Special and Tea disclaimed): Tetley and Co., vs. Bay State Fishing Co. (23, C.C.P.A.-969; 82F [2d] 299). The first is used on *fish*, variously put up; the other on *tea*. Court ruled that the goods are of the same descriptive properties but specifically different. "Taking into consideration the differences in the marks and the dissimilarity of the goods on which the respective marks are used," the Court held that concurrent use in trade of the two marks would not be likely to cause confusion.

"AEROLATOR" and "KELVINATOR": Kelvinator Corporation vs. Norge Corp. (Borge-Warner Corp. substitute) (25, C.C.P.A.-857; 94F [2d] 384). First used on air conditioning apparatus; second on refrigerators. Goods held to be of same descriptive properties, but specifically different. The suffix "-ator" is common to both marks and in the trade generally. It is not the dominating feature of either mark and the prefixes "Aerol" and "Kelvin" are quite dissimilar. The goods are comparatively expensive, "are purchased with a considerable degree of care and discrimination on the part of the purchaser . . . . They are not a matter of every-day purchase upon the part of an individual like food products or other products that require frequent replacement."

"DICAL-D" and "DIAL": Ciba Pharmaceutical Products, Inc., vs. Abbott Laboratories; Society of Chemical Industry in Basle, vs. Same. (50 U. S. P. Q. 139; C.C.P.A. 7-2-41.) Goods probably of same descriptive properties but entirely different in character and uses. "Dial" is used as a dormative, sedative, or hypnotic while "Dical-D" is a preparation used to meet Vitamin D, calcium and phosphorus deficiencies. One item is sold over the counter in any drug store to any purchaser, while the other is sold only on a doctor's prescription. "The fact that both are medicinal in character and have a therapeutic effect on users, of necessity makes carefulness in selection imperative."

Infringement with unfair competition

"PEPTOMINT" and "PEP-O-MINT": L. P. Larson, Jr., Co., et al., vs. Lamont, Corliss and Co.; Same vs. Mint Products Co. (265-O.G. 148, 257 Fed. Rep. 270). Appellant, Larson, registered in 1912 a trademark showing on an arbitrary design, the disclaimed words "Peptomint Gum," and re-registered the mark in 1915 with a disclaimer of the word "Mint" apart from "Pepto." In 1914 he notified the appellee, Lamont, that its use of a certain flavor-indicating mark, "Pep-O-Mint," infringed his marked "Peptomint." The evidence indicated that "Peptomint" was generally considered a corrupt spelling of "peppermint" and was so pronounced; that appellee did not imitate appellant's labels in any way nor make any attempt to palm his goods off as those of the appellant, was not guilty of unfair competition. In the Mint Products Co. case, appellant was himself guilty of unfair competition in changing his labels so as to imitate the display on appellee's labels, which through long and extensive advertising had acquired a secondary significance as indicating the origin of appellee's goods.

"CHIPSO" and "CHASE-O" (confusingly similar): The Procter and Gamble Co. vs. J. L. Prescott Co. (22, C.C.P.A.-1173; 77F [2d] 98). Appellant's (Procter and Gamble's) registration ordered canceled. Appellee established prior use and the Court held that there was a likelihood of confusion in trade at the time appellant's mark was registered and that such mark should therefore not have been registered at that time. It was not necessary that the appellee, petitioner, establish actual confusion in trade. Furthermore, it was not material in this proceeding that the appellee, after the registration of appellant's trademark, changed both the design of its carton and the composition of its product to make them more nearly like those of the appellant. All questions of appellant's right to use its marks and of unfair competition were disregarded, the only question properly before the Court being that of appellant's right to register. Said the Court: "The question of simulating the size and color of packages is a subject matter which belongs to domain of unfair competition. We are not concerned with it here."

Unfair trading

There is no unfair competition merely because plaintiff's and defendant's containers are similarly colored where they do not look much alike and defendant places its name on its containers. Taylor Instrument Co. vs. Fee and Stemwedel, Inc. (District Court of N. D. of Ill., 5-6-41).

Where an arbitrary word used as trademark for certain fruits had acquired a secondary significance as indicating origin in the plaintiff, defendant's *use* of the same word in connection with fruit juices constituted unfair competition. California Fruit Growers Exchange, et al., vs. Windsor Beverages, Ltd., et al. (48, U. S. P. Q. 608; 2-28-41—C.C.A.-7th Circuit Court).

Where defendant adopted a label with the same blue border and red script of the wording, the only difference being in the brand names and those having the same significance, the differences were submerged in the more prominent features of the label which were copies, and defendant was guilty of unfair competition. Kraft-Phenix Cheese Corp. vs. R. E. Robertson, Inc. (25, T.M. Rep., 119; U.S.D.C., East. Dist. of Ill., 12-14-34).

Where defendant had so simulated in coloring and marking the caps, cartons and labels of the plaintiff as to mislead the purchasing public, he was guilty of unfair competition, even though he did not infringe plaintiff's trademark. Simulation amounting to unfair competition does not reside in identity of single features of dress or markings nor in indistinguishability when the articles are set side by side, but is tested by the general impression made by the offending article upon the eye of the ordinary purchaser or user. If the general impression which it makes when seen alone is such as to lead the ordinary purchaser to believe it to be the original article, there is an unlawful simulation. Chesebrough Mfg. Co., Consolidated vs. Old Gold Chemical Company, Inc. (25, T.M. Rep, 149; U.S.C.C.A., 6th Circuit Court, 4-13-34).

The facts that defendant adopted a tin-foil wrapper for its cheese and that its labels are in triangular shape does not convict it of unfair competition where the plaintiff had previously adopted a similar wrapping and similarly-shaped labels, such wrapping and shape of labels being public property. Wm. Faehndrich, Inc., vs. Wheeler Riddle Cheese Co., Inc. (19, T.M. Rep., 356; U.S.D.C., East. Dist. of N. Y., 1929).

Defendant's use of the trademark "Gold Mark" for hosiery on labels having similar colors and stripes as those upon which plaintiff displayed its trademark "Gold Stripe," was obviously unfair competition as well as trademark infringement. Court held it was no test of infringement that the ordinary purchaser could discern dissimilarities between plaintiff's labels and symbols and those of the defendant, when they are placed side by side. The test was whether the similarity was such that it would mislead the ordinary observer or purchaser. Gotham Silk Hosiery Co. vs. Reingold (210 N. Y. Sup. 38; 16 T.M. Rep. 368).

Where no fraudulent intent was shown, it was not unfair competition for defendant to put out toilet preparations in combination gift boxes, generally much like those of the plaintiff in size, shape and color of cartons or boxes, no one feature of the box being exactly like that of plaintiff. Both were limited, by public taste, in their selection to containers of delicate coloring, the inscriptions being different but inconspicuous. As a rule, neither the use of same colors nor of same form of containers, cartons or labels constitutes unfair competition, when such features are in common use in the trade, especially when they serve purposes of utility, convenience or attraction. (U.S.D.C.-27T.M. Rep. 554—approved by C.C.A. 3d Circuit Court, 39 U.S.P.Q. 86).

Protecting the results of research

by George S. Hastings

The principal method of protecting the results of research is, of course, by the effective use of patents. Other protective measures are less certain. For example, one is by the highly risky and often very impractical method of keeping the invention a secret. Another is through the use of trademarks. Still another involves the use of common law rights in invention.

While practices such as these, particularly the use of trademarks (see p. 112 and p. 113), may sometimes be valuable supplements when used in conjunction with patents, patents themselves are much more effective. Because of their superiority as protection, and because of their general use for the purpose, this discussion will be confined to the patent as a medium for establishing inventors' rights.

How to benefit by the U. S. patent system

Probably more misconceptions are prevalent regarding patents than concerning any other well known subject. Of these misconceptions, more later. It has been wisely stated that it is not so much what people *don't* know about patents that gets them into trouble as it is what they *do* know about patents—that is, what they *know* about patents which isn't so.

One object of this article is to eliminate some of the more common misconceptions. However, its main purpose is to tell how best to use the specialized knowledge of others in protecting the results of research. Indeed, in this highly technical field, it is upon the knowledge of others that those interested in the patenting of inventions must rely.

Fortunately, to derive the benefits of the United States patent system, a detailed knowledge of patent law is not necessary for those wishing to protect an invention. However, it is important for the inventor or the promoter of an invention to recognize when patent help is needed, and to have some factual background in order to discriminate between reliable and unreliable sources of information. In brief, to protect an invention, it is necessary to have an appreciation, based upon facts, of what the proper use of the U. S. patent system can do for research. It is specifically necessary to have:

1. Sufficient knowledge of patent fundamentals to deal with patent specialists intelligently and to distrust patent information which does not come from an authoritative source
2. A knowledge of what patent help is needed and when it is needed
3. Information about how to obtain outside patent counsel
4. Familiarity with procedure in organizing a patent department
5. Knowledge of how to make effective use of patent council
6. Understanding of general procedure to follow in order to lay a sound basis for really good patent protection.

Patents are an incentive for research

Patents provide a powerful and stimulating incentive system for industrial research, and the success of this system is demonstrated by the leading part patents have played in the development of our country since the first patent legislation was passed in 1790. The effect of this incentive system is to make it worth while for the inventor, developer and promoter to spend the money, effort and time necessary to make and commercialize something which is new and better for the public's use.

The theory and basis of our United States patent system is summarized with characteristic clarity and conciseness in Article I, Section 8, of the Constitution, which provides that: "Congress shall have the power—to promote the progress of science and the useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

Note, particularly, that the primary object of the patent system is to benefit the public by promoting the progress of science and the useful arts, the benefit to the inventor being secondary. Of this the courts are well aware, and anyone attempting to obtain a valid patent must prepare from the start to demonstrate that such invention promotes the arts in such a manner as to be of use and benefit to the general public.

Common misconceptions

The nature of the protection granted by patent becomes clearer upon consideration of some of the more important fallacies common to patents, of which the following are examples:

1. *That the patent certificate means exactly what it says when it states that the inventor is given the exclusive right to make, use and sell the invention*—Actually the inventor is given, not the right to make, use and sell, but simply the negative right to exclude others from making, using and selling the invention which is covered by the claims of the patent.

Thus, a person who acquires a valid patent—from another line—acquires two things: (1) freedom from being excluded by the former patent owner from practicing the invention covered by the claims of the patent and (2) the right to exclude others from practicing the invention covered by the claims.

Many things which might otherwise seem to be puzzling about patents will be clear if it is kept in mind that the patent gives only a negative right to *exclude others* from practicing the invention claimed and not the positive right to practice it; and that the invention from which

others are excluded is that which is *claimed* at the end of the patent and not that which is described or illustrated therein. The latter is merely included as an example which explains and illustrates the invention which is claimed in the patent.

In short, a patent is like the fence around a field and not the field itself, and the area fenced in is determined from the claims.

2. *That the grant of a patent protects the owner of the patent from infringement if manufacture is in accordance with the disclosure of the patent*—This fallacy follows from what has just been discussed. There may be an earlier patent having claims covering the same invention, even though the later device is different enough so that a patent was granted on the differences.

It is always well to remember that the Patent Office is looking out for the welfare of the public, not the inventor, and examines patent applications to determine whether they will promote the useful arts. The Patent Office pays no attention to whether or not the inventor's ideas infringe.

3. *That employees have to assign to their employers inventions made during their employment*—In the absence of a contract, such an inventor would not have to assign to this employer. This is true even though such inventions are made through use of the employer's time and the employer's material.

Exceptions arise when the employee is specifically hired to make a definite type of invention. A very limited license or shop right may arise under the circumstances cited. From the point of view of the employer, the only effective safeguard is for him to have a specific contract with the employee.

4. *That because an invention looks the same as one already patented it infringes and because it looks different is it free from infringement*—Neither is a really safe test. The real test is that the essential structure, function and result is the same as that claimed in the patent, regardless of superficial differences and likenesses in outward appearance.

It is a fairly common occurrence for the defendant in an infringement suit to be quite surprised when told he infringes, because his product looks so different from the plaintiff's that he overlooked the fact that the principle was the same.

5. *That the first to invent or the first to file is thereby entitled to the patent*—According to United States practice, the first to invent is entitled to a patent, as against someone else who invented later but filed earlier, *if* he can prove that he was the first to invent—and meets satisfactorily certain requirements as to diligence in carrying his invention forward either to successful test (known as reduction to practice) or to filing.

The thought behind this principle is not to penalize the inventor who works his invention out thoroughly before filing. However, it may nonetheless be true that the earlier inventor who files later may have difficulty in proving he was first—or sufficiently diligent.

The great value of filing first and thus putting the burden of proof on the other party, is shown by the fact that in a great majority of patent interferences the first to file gets the patent.

6. *That a patent is presumed valid until proven invalid*—This was once a reasonably correct assumption. But, due to a raised standard of invention on the part of the courts, and especially the United States Supreme Court, without a corresponding change in the standard of invention utilized in the examination of patent applications in the Patent Office and the tribunals to which appeals from the Patent Office are made, it is much safer and more realistic to assume that a patent is invalid until investigation has revealed a good reason to believe that it is valid.

Another reason for investigating first is that the Patent Office is understaffed and the examiners often cannot make an adequate search in the length of time which is available to them.

These illustrations could be multiplied but they show sufficiently the danger of assuming anything is true of patents because it is common knowledge.

In the field of patents, unless the answer is known beyond doubt, it is far safer to investigate or to get expert advice—and get the advice before action, not afterwards.

What patent help is needed and when

Enough has been said to make it clear that a search organization needs patent help long before it is ready to file a patent application and before it has developed a marketable product.

In the early stages of development of a small research organization, what is needed first is a capable outside patent attorney, or firm of attorneys, plus good patent liason facilities.

A good patent liason man is one who really knows the values of the art of his particular organization and who sees that proper records are kept and refers matters to the outside attorneys as soon as it is apparent that a patent question has arisen or that an application for a patent should be filed.

At this stage, it is not necessary that the liason man be able to do the actual patent soliciting, though it is later often found desirable to combine both functions in the same person, or organization.

Good management of the patent affairs of a research organization is largely a matter of foresight in promptly appreciating when a patent problem is arising and of getting competent advice in handling the problem and avoiding trouble later.

A case history

Suppose, for example, the research organization of Blank & Blank is given the problem of making a moisture-proof breakfast food package. Immediately, the organization's patent man will realize that a part of the preliminary study should be an investigation of the various patented solutions to this problem, especially in connec-

tion with the packaging of cereals and the like, and that at this point it should be arranged to make such a thorough study.

Occasionally investigation has revealed that no research was needed—to solve the given problem. Nothing more than a readily obtainable license may be needed in many cases.

Should subsequent research settle on one type of moistureproof coating, the patent man will realize that an infringement or right-to-use question has arisen, and that an expensive development program should not be embarked upon without a search to determine whether or not infringement is present.

Indeed, a search of this type may well serve many purposes for it is quite apt to elicit helpful information for facilitating the research and development program, as well as valuable information as to what competitive organizations are doing along the same lines.

Suppose, after the expenditure of some thousands of dollars, it is later discovered that by putting some ingredient in the coating, a surprising increase in the strength of seal and resistance to water-vapor transmission is obtained.

At this point the experienced patent specialist will appreciate the fact that a valuable invention may have been developed. He will want the date when the discovery was made, and the signature of the inventor to his discovery, corroborated by witnesses. He will want to refer these data to a patent attorney for determination as to whether or not an application should be filed. The patent attorney will review previous searches, and possibly will conduct an additional search.

The attorney should be informed of the origin of the invention, of the nature and degree of improvement in performance it effects, and of what was previously tried. Alternatives should be suggested and considered to show the possible equivalents and to demonstrate the entire scope of the invention.

With this knowledge the patent attorney will be in a position to lay the basis for a suitable patent, if he decides to do so. He will then file an application for a patent in the full light of knowledge of the prior history of the invention. He will know what difficulties have been overcome, what is important and what is trivial, and he will know exactly what distinguishes this invention from all prior ones.

If, after the application has been filed, it is discovered that the coating has an additional valuable quality, the attorney should be promptly informed of all of the related facts in the matter.

Then suppose that Blank & Blank decides to market the product in quantity. Before this is accomplished the patent attorney should be asked to determine that final changes and additions do not infringe. The patent attorney, at this point, should also determine whether any such changes are worth patenting, in order that they may be filed on within a year of public use or sale.

After a year of public use of a product it is too late to file and obtain a valid patent. Public use, incidentally, can occur long before large scale marketing, or even before products leave the factory, if experimentation is no longer necessary and if the products are sold or if they have been demonstrated for the purpose of obtaining a sale.

Blank & Blank, let us say, puts the product on the market and it proves to be a great success, but a competitor comes out with a waterproof package having a coating containing an equivalent ingredient and producing the same results. Another competitor gives notice that Blank & Blank's product infringes his slightly earlier patent. Blank & Blank is able to meet these challenges with complete confidence.

It has had continuous patent advice. It has good records. Its attorney knows when the inventions were made, how the product was developed, and what the prior art was, so that Blank & Blank's knowledge through patents gave it some intimation of what these competitors were most likely to do.

The patent alleged to be infringed upon had already been considered, and a defense was ready. The equivalent ingredient had also been considered and the claims drawn to cover it.

But just imagine the consternation on the part of the management of Blank & Blank if its research department had made no patent preparation! However, it is not unusual for concerns conducting research work to secure, for the first time, patent advice on a product when it is about to be marketed. Much money has been lost to firms because of such delay.

Outside patent counsel

Most organizations conducting research employ outside patent counsel such as that obtainable from a reliable firm of patent attorneys. Organizations not availing themselves of help of this nature should promptly take measures to secure it.

Selection of a patent attorney is a step of great importance, requiring the same careful consideration as the selection of a general attorney. Usually, patent attorneys can be located through friends, or affiliated companies, who already enjoy satisfactory patent counsel, or through a company's general counsel.

It is well to check the candidates in two ways: (1) if they are to be used to solicit patents before the Patent Office, it can be determined whether or not they are registered for practice before the Patent Office by requesting a list from the Patent Office of registered attorneys, and since patent attorneys are registered serially, the registration number gives some indication of their experience; and (2) if the attorneys are located in a large city, their standing in the patent association of that city may be ascertained without much difficulty.

Candidates for such work, of course, should be fully trained lawyers and members of the bar. As a rule, the opinion of the employer's general counsel or of those who have worked with the patent attorneys in question is the best guide.

It is often urged that it is desirable for a patent attorney to be located in Washington, convenient to the Patent Office. However, it is much more important for him to be

located near the client, in order that close contact may be maintained between client and attorney and in order that the attorney may confer directly with the inventors and engineers. In this way he will be able to see tests and to examine samples throwing light on the inventions which are to be patented.

How to organize a patent department

For quite small companies, not offering enough patent work to utilize more than half of a man's time, little more is needed than a liason man, familiar with the commercial and patent values of the company's business, to act as an intermediary between the company and the outside patent attorney it employs.

As a company grows larger, it usually becomes desirable to accomplish part of the patent work within the company organization, particularly soliciting before the Patent Office, making searches, making preliminary determinations as to infringement questions, building up a patent library, and similar work which requires frequent and continuous contact between the patent adviser and research worker.

Hence, most concerns for whom research is important, when they reach a gross business of sufficient volume, find it desirable to establish an inside patent department of their own. The outside patent counsel is very valuable at this point in helping to secure satisfactory patent men who will be able to handle the job.

Generally speaking, such men should have some technical training, plus training in patent law and in the handling of patent applications. They should have obtained law degrees or should be prepared to do so.

Such men would at first work under the close supervision of the outside counsel, and they would continue to work with the advice of outside counsel whenever any matters of special importance or of unusual difficulty might arise.

In selecting personnel for the patent department, it is important to consider their ability to get along with the workers in the concern, and if there is a qualified individual already connected with the concern, especially in its engineering department, having a flair for patents, he might well be selected for the purpose, and given such further training as is needed to qualify him fully to practice before the Patent Office.

An excellent discussion of patent department organization is that of Otto S. Schairer, of the Radio Corporation of America, published in the *Journal of the Patent Office Society*, p. 875, December 1941.

How to make effective use of patent counsel

The way to obtain a poor patent is simply to hand over to the patent attorney a description of the invention and then sit back and wait for the issue of the patent. As much depends on the diligence and completeness with which the research organization plies the attorney with information as on the attorney himself. To do his work, the attorney must be furnished with complete data.

Securing a good patent is a continuous process and consists in supplying the patent attorney with much more than the detailed disclosure of the invention to be patented. To do a good job the patent attorney must know the background of prior art in which the new development arose.

Drawing the claims to the invention requires that the patent attorney cover the inventor's actual contribution. At the same time, he must carefully exclude from the scope of the claim that which was known prior to the invention at hand.

There is also the matter of emphasis. An attorney can draw claims to all features of the invention with equal emphasis—in fact, he will have to do this unless someone aids him in determining what is important and what is unimportant. Without this knowledge it is quite easy to end up with a patent having excellent claims to that which is of no importance and *having no claims* at all to that which *is* important.

Claims to subject matter which has a commercial value are comparatively difficult to establish, due to more complete coverage by prior art, and the consequent reluctance of the patent examiner to grant such claims in the anticipation of interferences and infringement suits, which might subsequently reverse his decision. Unless the attorney has a correct evaluation of the important features to be emphasized, he is likely to be misguided into obtaining those claims which may perhaps possess the least commercial value.

The greatest assistance an executive can offer his patent staff is to secure close and continued cooperation between that staff and those who know all of the details of the development and of the commercialization of the invention in question.

Ammunition needed by attorneys

Patent attorneys cannot work in a vacuum. They need patent ammunition, and they need it even when they don't know that it exists or when they think they have enough. If a good patent is to be obtained those handling the research and development must ensure that the patent attorney gets this ammunition—and that he gets it whether he asks for it or not.

Such patent ammunition includes any information which may throw light upon:

1. The real nature or value of the invention
2. The difficulties overcome in making the invention and in successfully applying it
3. The impact of the invention on industry
4. The manner in which the invention was developed
5. What competitors are doing
6. How the invention affects costs and how it affects the consumer
7. What feature appeals most to the user
8. Test results, which should include the failures as well as the successes

Any information about alternative constructions, substitutes, simplifications, modifications, effects in reducing costs, etc., is vital, and it could easily account for the difference between an effectual patent and one which proves to be ineffectual.

Procedure to follow during research

Only the proven acts of inventors are legally recognized. Ordinarily an inventor's unsupported evidence is not valid.

It is imperative, therefore, that dated and witnessed records be kept of all of the research work. Various recording systems are employed, some quite elaborate, but the only requisite is that the inventor date and sign his disclosures and that he have them witnessed by someone who understands the invention. Bound notebooks with provision for detachable carbon copies have been found to be valuable.

Even the first rough sketches should, as a matter of routine, be dated and signed. It is particularly important that the first sketches and drawings and first descriptions be signed and dated, even if only in scratch pad form. Unfortunately these informal sketches and descriptions are likely to be overlooked.

It is also very important that there be a set of dated records of the making and testing of samples or models, and that such tests be witnessed. These items are the backbone of the testimony when two inventors are thrown into interference because of similarity.

It is important for those concerned to follow the development of inventions sufficiently to know who invented any given article or device. The law requires that the inventor sign the patent, and if it is discovered that the patent was not signed by the real inventor (the one who invented the subject matter claimed), the patent is then not valid.

Moreover, morale in a research organization may be seriously undermined if there can be any suspicion that the real inventor does not get the credit but that some more favored person has been permitted to sign the patent and reap the benefits.

Publications, such as scientific papers, should be watched in order that applications may be filed within the year allowed after publication.

Recent court decisions

Recent court decisions have had a definite bearing on protecting the results of research. Changes in the patent statutes are rare.

Court decisions modifying the way in which the patent statutes are interpreted and applied have been frequent and substantial, sometimes amounting to judicial legislation of a far-reaching character. In the last decade the Supreme Court has raised the standard of invention to such an extent that only a rather small percentage of these patents coming before that tribunal during this period have been held valid.

In a number of recent patent cases which have come before the U. S. Supreme Court, the Court has weighed the public interest against the degree of incentive which should be provided for the inventor. In the great majority of these cases it has quite evidently been the view of the Court that some of the rights of exclusion granted in patents could be cut down without any detriment to our present type of industrial economy.

Among the decisions taking the above view are several which overrule past decisions. These indicate that a patent to a combination of ingredients or parts may not be used to control in any way the source from which licensees or competitors obtain the unpatented ingredients or parts, even though the ingredients or parts have no other use than in the patented composition or combination.

The "Flash of Genius" case

One famous decision of the Supreme Court, often known as the "Flash of Genius" case, has been used as the basis for subsequent decisions of the lower courts, holding that the presence of invention should be determined subjectively—that is by consideration of the mental processes by which it was discovered—as well as by the more common objective test of judging an invention by what it is—that is by characteristics such as its novelty, its usefulness, its effect on the art, etc.

It is questionable if the Supreme Court meant more than to emphasize and reaffirm the well known test that an invention, to be patentable, must be sufficiently obscure to involve a degree of creativeness beyond the ability of the ordinary artisan skilled in that particular art.

One decision by Thurman Arnold of the Circuit Court of Appeals in the District of Columbia—Potts v Coe—has gone so far as to indicate that the identical invention might be patentable if arrived at by a sudden flash of genius on the part of one inventor alone, but would not be patentable if it were the final result of a systematic investigation in which the inventor took part and which relied entirely upon the facilities of an organized corporate research laboratory.

Other circuits have not followed this decision. However, it is likely to have an effect on the Patent Office because one class of appeals from the decisions of the Patent Office goes to this circuit only.

Conclusion

The United States patent system is one of the most effective incentive systems known, and any organization which fails to take full advantage of it is overlooking a great source of industrial motive power. The system makes research, which results in valuable new products, self-financing, by giving seventeen years control to the researcher or to his organization.

It also furnishes a very valuable incentive to the worker within the research organization, since, figuratively speaking, it proffers a medal of honor, and it thus serves as a measure of accomplishments for promotions or bonuses.

The present temper of the courts and of Congress is to recognize true progress and to reward intellectual contributions to public welfare. But these powers are quick to deny the benefits of our patent system when it is believed that patents are being used contrary to the intent of the Constitution, as an intrenchment against change, or to maintain a favored position no longer justified by current benefits to the public.

Today, therefore, the best patent advice will prove ineffective, in the long run, unless it is coupled with continued and vigorous research directed toward real advance in the arts useful to the public.

Patent review

The following complete list of recent U.S. patents pertaining to the packaging industry is classified alphabetically so that all new patents relating to each of the various facets of packaging may be found together. For example, all types of applicators, including daubers, brushers, etc., will be found under "Applicators."

In this listing, the entries are arranged under each classification in numerical sequence, and the title of each patent is given.

Comprehensive abstracts of most of the patents have been published in the monthly *U.S. Patent Digest* department of MODERN PACKAGING magazine. In parentheses after the entries below is given the month of the 1944 issue of the magazine in which the abstract, as well as the date of issuance and the names of the inventors and assignees (if any), may be found.

Copies of any of these patents may be purchased from the U.S. Patent Office, Washington, D. C., for 10c in currency, money order or certified check. When ordering copies, patent number should be given.

Applicators

Applicators, daubers, brushers and droppers made of metal, glass, bristle and rubber:

2,333,320—Dispensing Device (Feb.)
2,351,476—Applicator

Bags

Envelopes and liners made of paper, plastic, metal foils, asphalt and wax coatings:

2,333,638—Process of Packaging Dehydrated Molasses
2,333,773—Paper Bag (Feb.)
2,333,887—Protective Coating & Process of Manufacture Thereof
2,334,156—Package for Tea & Like Commodities
2,334,256—Method & Apparatus for Making Bags
2,334,413—Envelope
2,335,115—Return Safety Window Envelope with Concealed Carrier Opener
2,335,470—Envelope & the Like (Mar.)
2,335,844—Paper Bag (Mar.)
2,336,025—Envelope (Mar.)
2,336,449—Hermetically Sealed Bag (Mar.)
2,336,584—Bag (Mar.)
2,336,630—Locking Closure for Paper Bags & Other Containers (Mar.)
2,338,254—Valve Bag (Apr.)
2,338,290—Reinforced Garment Bag (Apr.)
2,338,927—Closing & Clamping Device (Apr.)
2,338,992—Continuous Envelope Assembly (Apr.)
2,339,068—Paper Sack (Apr.)
2,339,304—Sealed Bag & Process for Making same (Apr.)
2,340,700—Multiform Envelope (May)
2,341,634—Stamp Envelope (May)
2,342,324—Bag-expanding Means (May)
2,342,702—Continuous Form Envelope (May)
2,342,715—Wrapper for Hack-saw Blades
2,344,891—Combined Envelope & Letter Sheet
2,346,419—Sealing Envelope
2,348,041—Handkerchief Packet (Aug.)
Re:22,490—Bag (Aug.)
2,350,802—Rip Envelope (Aug.)
2,350,901—Garment Bag (Aug.)
2,351,882—Garment Bag
2,353,605—Bag (Oct.)
2,354,820—Pocket Envelope (Oct.)
2,355,313—Bag (Oct.)
2,355,348—Multiple-use Mailing Folder (Oct.)
2,356,066—Safety Envelope
2,356,076—Envelope for Metallic Objects
2,359,033—Valve for Bags (Nov.)
2,360,720—Block-bottom Closure for Multiple Paper Bags or Sacks (Dec.)

Bottles

Bottles, jars, jugs, and vials, made of glass, plastics and paper:

2,333,328—Milk Bottle Shield (Feb.)
2,340,353—Bottle (May)
2,341,102—Bottle (May)

Boxes

Boxes, cartons and crates, made of paper, fibreboard, corrugated board and wood:

2,333,116—Egg Crate (Feb.)
2,333,123—Gable Top Carton (Feb.)
2,333,181—Carton Construction (Feb.)
2,333,244—Box (Feb.)
2,333,560—Bottle Carrier (Feb.)
2,333,587—Fold-close Package (Feb.)
2,334,041—Container (Feb.)
2,334,077—Paper Roll Package (Feb.)
2,334,114—Paperboard Carton (Feb.)
2,334,425—Carton
2,334,536—Dispensing Carton
2,334,546—Package
2,334,634—Fibreboard Carton
2,334,805—Container
2,334,851—Container & Dispensing Closure Therefor
2,334,997—Paper Dispensing Package
2,335,019—Moistureproof Package
2,335,022—Container & Carrier for Bottled Goods
2,335,291—Dispensing Attachment for Packages (Mar.)
2,335,363—Combination Container & Dispenser (Mar.)
2,335,366—Carton (Mar.)
2,335,345—Folding Box Construction (Mar.)
2,335,766—Packaging for Coiled Photograph Film (Mar.)
2,335,865—Packaging Method (Mar.)
2,335,913—Package or Container (Mar.)
2,335,914—Cup Package & Carton Therefor (Mar.)
2,336,088—Container (Mar.)
2,336,158—Container (Mar.)
2,336,345—Container (Mar.)
2,336,503—Sliding Closure for Bellows or Gable Boxes (Mar.)
2,336,655—Carton (Mar.)
2,336,842—Carton (Mar.)
2,336,857—Carry-home Bottle Container (Mar.)
2,336,706—Dispensing Carton (Mar.)
2,336,731—Display Container (Mar.)

2,336,943—Transparent Unbreakable Nonrefillable Container (Mar.)
2,337,039—Carton With Snap Lock Bottom Closure (Mar.)
2,337,198—Carton (Mar.)
2,337,199—Carton (Mar.)
2,337,370—Package (Mar.)
2,337,755—Carton With Interlocking Bottom (Mar.)
2,337,891—Package (Mar.)
2,338,019—Fibre Container (Mar.)
2,338,260—Carton Including Pouring Means (Apr.)
2,338,315—Locking Means for Shipping Box (Apr.)
2,338,604—Flexible or Pliable Container (Apr.)
2,339,112—Display Container (Apr.)
2,339,156—Dispensing Carton (Apr.)
2,339,176—Carton for Bottles (Apr.)
2,339,224—Carton (Apr.)
2,339,278—Bottle Carrier (Apr.)
2,339,301—Container (Apr.)
2,339,382—Carton (Apr.)
2,339,383—Dispensing Carton (Apr.)
2,339,445—Carton (Apr.)
2,339,555—Spark Plug Packing Case (Apr.)
2,339,656—Box (Apr.)
2,339,665—Container (Apr.)
2,339,729—Chick Box (Apr.)
2,340,089—Combined Package & Dispenser (Apr.)
2,340,090—Combined Package & Dispenser (Apr.)
2,340,124—Container (Apr.)
2,340,148—Combined Display & Shipping Device (Apr.)
2,340,230—Carrier for Containers (Apr.)
2,340,394—Shipping Box (May)
2,340,422—Container & Blank Therefor (May)
2,340,473—Container (May)
2,340,546—Container (May)
2,340,651—Container (May)
2,340,753—Nonrefillable Box (May)
2,340,976—Container Attachment (May)
2,341,056—Container & Method (May)
2,341,119—Paper Towel Dispenser Package
2,341,368—Dispenser for Sheet Material (May)
2,341,374—Plant Shipping Container (May)
2,341,379—Sealed Package & Method of Making Same (May)
2,341,845—Container & Method of Making the Same (May)
2,341,940—Receptable (May)
2,342,158—Container & Method of Manufacture (May)
2,342,198—Method of Making Cartons (May)
2,342,236—Method of and Means for Binding Match Book Assemblies (May)
2,342,240—Cigarette Package or the Like (May)
2,342,551—Folding Box (May)
2,342,564—Container (May)
2,342,623—Collapsible Container (May)
2,342,873—Folding Box (May)
2,342,893—Display Box (May)
2,342,968—Dispensing Carton (June)
2,343,024—Shipping Container
2,343,222—Individual Package (May)
2,343,550—Container & Process of Making Same
2,343,716—Fibre Container
2,343,857—Pouring Carton
2,344,008—Box Structure
2,344,009—Box Handle & Latch
2,344,059—Match Packet & Method of Making it
2,344,141—Battery Carrier
2,344,182—Display Device for Suction Cleaning Apparatus
2,344,210—Book Matches & Cover
2,344,325—Wire Opening Container
2,344,350—Carton
2,344,359—Paper Container Blank
2,344,369—Package
2,344,437—Combined Greeting Card & Container
2,344,448—Fibreboard Receptacle
2,344,486—Receptacle
2,344,525—Container
2,344,559—Carton Wrapper
2,344,567—Collapsible Egg Carton
2,344,577—Container for Cosmetic Powders & Other Cosmetics
2,344,852—Container
2,344,857—Tube Carton
2,344,862—Narrow Fabric Package
2,344,919—Storing & Handling Cases for Phonograph Records
2,344,961—Nonrefillable Container
2,344,995—Collapsible Container
2,344,999—Box Construction
2,345,000—Box & Closure Construction
2,345,190—Packaging of Wallpapering Material
2,345,309—Sanitary Tissue Container
2,345,350—Carton
2,345,565—Bottle Holder (June)
2,345,566—Bottle Carrier (June)
2,345,567—Bottle Holder (June)
2,345,568—Bottle Holder (June)
2,345,646—Box Carton or Similar Device (June)
2,345,716—Hollow Walled Carbon (June)
2,345,746—Bottle Carrier (June)
2,345,810—Folding Box (June)
2,345,978—Package (July)
2,346,003—Collapsible Carton (July)
2,346,087—Container for Tobacco, Cigarettes & Pipe Cleaners, etc. (June)
2,346,165—Container (July)
2,346,206—Divided Carton (July)
2,346,400—Cellular Egg Carton (July)
2,346,407—Commodity Package for Cigarettes and the like (July)
2,346,466—Shipping Container (July)
2,346,488—Dispensing Package (July)
2,346,538—Container (July)
2,346,564—Package Structure (July)
2,346,591—Packaging (July)
2,346,684—Container (July)
2,346,685—Container (July)
2,346,714—Container (July)
2,346,792—Cardboard Box (July)
2,347,021—Container (July)
2,347,161—Carton for Ice Cream Cones (July)
2,347,183—Container (July)
2,347,236—Container (July)
2,347,381—Package Opener (July)
2,347,422—Octagonal Box (July)
2,347,509—Method of Making Packages (July)
2,347,686—Container (July)
2,348,070—Carton (July)
2,348,084—Tire Cover & Package
2,348,140—Container Having Dispensing Spout (July)
2,348,310—Container (Aug.)
2,348,377—Carton (Aug.)
2,348,378—Carton (Aug.)
2,348,514—Liquid Dispenser (Aug.)
2,348,551—Packaging (Aug.)
2,348,689—Container (Aug.)
2,349,020—Carton (Aug.)
2,349,088—Carton (Aug.)
2,349,093—Match Package (Aug.)
2,349,241—Carton (Aug.)
2,349,362—Container (Aug.)
2,349,364—Chick Shipping Box (Aug.)
2,349,589—Carton (Aug.)
2,349,605—Dispensing Container (Aug.)
2,349,730—Tubular Container (Aug.)
2,350,232—Carton (Aug.)

(Continued on next page)

2,350,262—Carton (Aug.
2,350,467—Razor & Blade Holder
2,350,640—Case & Fastening Therefor
2,350,673—Collapsible Crate (Sept.)
2,350,798—Match Device
2,350,932—Chick Box Structure (Aug.)
2,350,950—Fibrous Covered Container
2,351,165—Carton (Sept.)
2,351,166—Carton (Sept.)
2,351,207—Luggage Box (Sept.)
2,351,223—Combined Cigarette & Match Package (Sept.)
2,351,306—Package (Sept.)
2,351,318—Container & Closure Therefor (Sept.)
2,351,378—Combination Display Board, Container & Pad (Sept.)
2,351,387—Molded Barrel-shaped Container
2,351,417—Carton (Sept.)
2,351,442—Blade Holder
2,351,447—Spectacle Case
2,351,469—Container for Match Books & the Like (Sept.)
2,351,470—Self-dispensing Package
2,351,528—Bottle Carrier (Sept.)
2,351,550—Container (Sept.)
2,351,596—Art of Merchandising Packaging (Sept.)
2,351,781—Tape Dispensing Container (Sept.)
2,351,804—Container (Sept.)
2,351,812—Package (Sept.)
2,351,825—Shipping Case (Sept.)
2,351,848—Container & Constricting Rim (Sept.)
2,352,066—Dispensing Container
2,352,393—Collapsible Paperboard Receptacle (Sept.)
2,352,633—Display Package
2,352,728—Container
2,352,865—Container for Asphalt Tar & Like Products (Oct.)
2,352,927—Lunch Box & Blank
2,352,994—Receptacle (Oct.)
2,353,178—Container & Method of Making Same (Oct.
2,353,298—Folding Box & Blank for Making Same (Oct.)
2,353,376—Container (Oct.)
2,353,395—Cigarette Package (Oct.)
2,353,456—Dispensing Container
2,353,522—Container
2,353,582—Receptacle & Closure Means Therefor (Oct.)
2,353,629—Pill Dispensing Container
2,353,656—Match Book Holder
2,353,746—Packaging Process
2,353,761—Carton or Container (Oct.)
2,353,762—Container (Oct.)
2,353,818—Container
2,353,819—Dispensing Container
2,353,932—Noncrushable Kit Construction
2,354,239—Telescopic Container (Oct.)
2,354,369—Bottle Carrier (Oct.)
2,354,370—Bottle Carrier
2,354,398—Attachment for Cigarette Packages
2,354,402—Combined Pencil & First Aid Kit
2,354,543—Carton (Sept.)
2,354,600—Folding Box
2,354,706—Photographic Package (Oct.)
2,354,741—Article Dispensing Container (Oct.)
2,355,044—Container (Oct.)
2,355,206—Folding Food Serving Box (Oct)
2,355,233—Container (Oct.)
2,355,250—Package (Oct.)
2,355,559—Cover for Containers (Oct.)
2,355,578—Container (Oct.)
2,355,729—Container
2,355,730—Leakproof Carton (Nov.)
2,355,804—Packaging Receptacle
2,356,106—Razor Blade Drier & Container
2,356,110—Package & Closure Therefor (Nov.)
2,356,194—Paper Box (Nov.)
2,356,632—Pill Box
2,356,969—Container (Nov.)
2,357,009—Carton
2,357,092—Container
2,357,093—Container (Nov.)
2,357,155—Container (Nov.)
2,357,161—Paper Cup
2,357,246—Container
2,357,309—Container (Nov.)
2,357,339—Package (Nov.)
2,357,415—Container & Method of Making Same (Nov.)
2,357,555—First Aid Kit (Nov.)
2,357,585—Package (Nov.)
2,357,996—Surgical String Package (Nov.)
2,358,124—Carton (Nov.)
2,358,194— X Box (Nov.)
2,358,270—Inner Closure for Container (Nov.)
2,358,295—Shipping Tray for Flowers (Nov.)
2,358,502—Dispensing Carton (Nov.)
2,358,523—Bottle Package (Nov.)
2,358,547—Sterile Package (Nov.)
2,358,569—Container (Nov.)
2,358,659—Carton Having a Pouring Spout (Nov.)
2,358,664—Spare Lamp Carton (Nov.)
2,358,709—Container (Nov.)
2,358,790—Captive Cover Carton (Nov.)
2,358,802—Carton or Container (Nov.)
2,358,924—Container (Nov.)
2,358,943—Packing Box (Nov.)
2,359,297—Package, Packing Container & Blank Therefor (Dec.)
2,359,298—Package, Container & Blank Therefor (Dec.)
2,359,335—Container & Method of Making Same (Dec.)
2,359,337—Dispensing Packaging (Dec.)
2,359,678—Heavy-duty Bottle Carrier (Dec.)
2,359,679—Film Carton with Mailing Tag (Dec.)
2,359,871—Dispenser for Rolls of Strandlike Material (Dec.)
2,359,882—Container & End Closure Therefor & Method of Making (Dec.)
2,359,986—Divisible Carton (Dec.)
2,359,999—Article Holder (Dec.)
2,360,117—File Box Closure (Dec.)
2,360,162—Holder (Dec.)
2,360,270—Match Packet (Dec.)
2,360,415—Reclosure Carton (Dec.)
2,360,439—Container (Dec.)
2,360,543—Dispensing Container (Dec.)
2,360,806—Carton (Dec.)
2,360,931—Carrying Case (Dec.)
2,361,079—Box (Dec.)
2,361,408—Container & Method of Manufacture (Dec.)
2,361,449—Article of Manufacture
2,361,464—Article of Manufacture
2,361,499—Article of Manufacture
2,361,580—Dispenser (Dec.)
2,361,594—Dispensing Device (Dec.)
2,361,597—Box or Container (Dec.)
2,361,603—Collapsible Paperboard Box (Dec.)
2,361,650—Two Compartment Box (Dec.)
2,361,659—Box or Container (Dec.)
2,361,876—Package & Method of Forming Same
2,361,879—Cigarette Package

Cans

Cans and drums made of metal, fibreboard and plywood:

2,337,730—Package for Milk & Other Fluid Products (Mar.)
2,338,094—Metal Container (Apr.)
2,338,397—Container for Liquids & Granular Substances (Apr.)

2,343,934—Lipstick Holder
2,346,385—Tearing Strip Can (July)
2,347,774—Cosmetic Holder (Aug.)
2,349,799—Lipstick Container (Aug.)
2,349,800—Lipstick Container (Aug.)
2,350,837—Magazine for Safety Razor Blades
2,351,395—Lipstick Container-dispenser (Sept.)
2,351,836—Dispensing Cask for Preserving Liquids (Sept.)
2,352,393—Liquid Dispenser
2,352,448—Holder for Lipstick & the Like (Sept.)
2,352,663—Shaving Stick
2,355,108—Container (Oct.)
2,355,181—Blade Magazine
2,355,565—Lipstick Case (Oct.)
2,356,401—Motor Oil Container (Nov.)
2,359,807—Magazine Safety Razor (Dec.)
2,359,865—Holder for Lipstick (Dec.)

Closures

Closures, corks, crowns, caps and stoppers made of glass, wood, metal paper and plastics:

2,333,781—Combination Lid, Opener & Pouring Spout for Containers (Feb.)
2,337,241—Bottle Cap
2,338,052—Crown Cap for Containers (Mar.)
2,338,705—Cap (Apr.)
2,339,343—Closure for Bottles & Jars & Other Containers (Apr.)
2,339,702—Closure (Apr.)
2,339,791—Evacuator for Fruit Jars (Apr.)
2,340,419—Closure (May)
2,340,754—Closure Fastener for Containers (May)
2,341,925—Container Closure (May)
2,342,215—Dispensing & Sealing Stopper (May)
2,343,024—Measuring & Dispensing Device (June)
2,343,571—Bag Closure
2,343,610—Dropper & Pourer Cap
2,344,985—Sealing Gasket for Siphon Bottles & the Like
2,345,737—Dispensing Receptacle (July)
2,347,605—Closure for Bottles, Jars & Similar Containers (July)
2,347,725—Closure Support (July)
2,347,835—Bottle Stopper (July)
2,348,014—Combined Bottle Closure & Dispenser (July)
2,349,247—Bag Closure (Aug.)
2,349,369—Bag Closure (Aug.)
2,350,312—Can Closure & Method of Making the Same (Aug.)
2,350,694—Bag-Closing Device (Sept.)
2,352,382—Closure (Sept.)
2,352,561—Closure for Sealing Means for Paper & Cardboard Receptacles (Sept.)
2,353,674—Cork
2,353,879—Bottle Cap (Oct.)
2,354,043—Bottle Closure (Oct.)
2,354,726—Releasable Joinder Lock (Oct.)
2,354,855—Container Closure (Oct.)
2,355,492—Bottle Stopper (Oct.)
2,355,493—Container Cap (Oct.)
2,356,825—Closure Member & Method of Applying Same
2,357,322—Closure for Jars & the Like (Nov.)
2,357,416—Cap (Nov.)
2,358,125—Bag Closure & Method of Making Same (Nov.)
2,359,561—Crown Rest (Dec.)
2,359,924—Closure (Dec.)

Labels

Labels, tags and seals:

2,345,342—Label, Tag & the Like
2,346,219—Adhesive Tape Sales Ticket (July)

Machines

Machines, for filling, weighing, sealing, labeling and wrapping:

2,333,898—Method of Packaging Fruit & Vegetable Juices (Feb.)
2,334,030—Tear Strip Applying Mechanism for Gum Stick Wrapping Machines (Feb.)
2,334,029—Gum Stick Wrapping Machine (Feb.)
2,335,502—Vacuum Sealing Device (Mar.)
2,335,738—Packaging Machine (Mar.)
2,335,750—Duplex Wrapping Machine (Mar.)
2,336,795—Wrapping Machine (Mar.)
2,336,962—Package Making & Filling Machine (Mar.)
2,337,032—Cap Applying Apparatus (Mar.)
2,337,033—Closure Cap Feeding Apparatus (Mar.)
2,338,047—Can Closing Machine (Mar.)
2,338,074—Method of Packaging (Mar.)
2,338,852—Vacuum Sealing Machine (Apr.)
2,338,887—Art of Labeling (Apr.)
2,339,035—Apparatus & Method for Vacuumizing Container (Apr.)
2,339,584—Method of Cutting & Wrapping Cake (Apr.)
2,339,866—Bottle Hooding Machine (Apr.)
2,339,896—Heat Sealing Machine (Apr.)
2,340,211—Machine for Applying Plastic Bands (Apr.)
2,340,341—Container Vacuumizing & Closing Apparatus (May)
2,340,639—Feeding & Serving Mechanism (May)
2,340,678—Packaging Machine & Circular Applying Mechanism Therefor (May)
2,340,835—Packaging Apparatus (May)
2,340,836—Method of Package Wrapping & Sealing (May)
2,340,883—Bag Handling Machine (May)
2,341,126—Apparatus for Sealing Containers (May)
2,342,584—Wrapper Feed (May)
2,342,735—Apparatus for Loading Granular Material into Receptacles (June)
2,343,104—Sealing Machine (June)
2,343,358—Machine for Manufacturing & Applying Bottle Caps
2,343,363—Glue Spreader, Surface Coater
2,343,439—Bag Filling Machine
2,344,185—Labelling Machine
2,344,340—Apparatus for Applying Tape Upon Articles
2,344,546—Apparatus for Applying Tops to Can Bodies
2,344,603—Machine for Making Cellulose Sheets and the Like
2,344,640—Packaging Method
2,344,643—Apparatus for Feeding Articles to Mail Treating Machines
2,344,994—Compound Measuring Device
2,345,560—Box Loader for Cans (June)
2,346,044—Method of Packaging Razor Blades (June)
2,346,056—Filling Machine (July)
2,346,118—Apparatus for Sealing Container (July)
2,346,613—Wrapping Machine (July)
2,346,776—Sealing Apparatus (July)
2,347,407—Heating Device for Bottle Caps (July)
2,348,201—Manufacture of Infusion Packages with Handles (Aug.)
2,348,483—Packaging Heavy Legged Articles (Aug.)
2,348,509—Means & Methods of Packaging Potato Chips (Aug.)
2,348,650—Packing Machinery (Aug.)
2,348,797—Crown Cap Selecting Machine (Aug.)
2,349,309—End Labeling Process & Apparatus (Aug.)
2,349,732—Method of Sealing the Mouths of Bags (Aug.)
2,350,244—Feeding Mechanism for Wrapping Machines (Aug.)
2,350,333—Automatic Bag Package Making & Filling Machine (Sept.)
2,350,418—Apparatus for Producing Filled Packages (Sept.)

(Continued on next page)

2,350,554—Apparatus for Opening & Filling Bags (Sept.)
2,350,560—Case Packer (Sept.)
2,350,690—Machine for Use in the Manufacture of Cartons (Sept.)
2,351,348—Capping Machine (Sept.)
2,351,349—Capping Machine (Sept.)
2,351,350—Process of Laminating Films (Sept.)
2,351,888—Detector Mechanism for Capping Machines (Sept.)
2,352,369—Container Making Machine (Sept.)
2,352,645—Container Making & Filling Machine
2,352,646—Method of Making, Packing & Sealing Cartridge Containers
2,352,761—Apparatus for Sealing Containers (Oct.)
2,352,762—Apparatus for Sealing Containers
2,352,763—Apparatus for Sealing Containers
2,352,764—Cap Feeding Apparatus (Oct.)
2,352,627—Fluid Dispensing System
2,352,663—Packing Machine for Containers & the Like (Oct.)
2,352,803—Means for Packing Frangible Articles (Oct.)
2,352,899—Sealing Head & Machine (Oct.)
2,352,949—Container Handling Apparatus
2,352,998—Method of Packaging Electric Blasting Caps
2,353,156—Capping Machine (Oct.)
2,353,182—Method of Forming Gasket Liners (Oct.)
2,353,200—Can Capping Machine
2,353,340—Cigarette Making Device
2,353,400—Capping Apparatus (Oct.)
2,354,989—Apparatus for Wrapping (Oct.)
2,355,073—Method of Packaging Milk (Oct.)
2,355,089—Can Filling Machine (Oct.)
2,355,385—Machine for Applying Closures to Bottles (Oct.)
2,355,478—Apparatus for Sealing Containers (Oct.)
2,355,479—Cap Feeding Apparatus (Oct.)
2,355,480—Apparatus for Sealing Containers (Oct.)
2,355,481—Cap Feeding Apparatus (Oct.)
2,355,500—Confection Packaging Machine (Oct.)
2,355,786—Sealing Means for Bags (Nov.)
2,356,142—Can Filling Apparatus
2,356,176—Filling Machine
2,356,319—Method & Apparatus for Applying Cap Removers to Bottles
2,356,472—Container Sealing Machine (Nov.)
2,356,644—Bread Wrapping Machine (Nov.)
2,356,737—Can Filling Machine
2,356,743—Tube Mill
2,356,875—Labelling Machine
2,356,893—Capping Apparatus (Nov.)
2,357,013—Control System for Fillers (Nov.)
2,357,173—Strip Affixing Device
2,357,245—Apparatus for Filling & Closing Container
2,357,349—Coating Machine (Nov.)
2,357,786—Seal Forming Mechanism (Nov.)
2,357,802—Apparatus for Packing Products (Nov.)
2,357,826—Capping Machine (Nov.)
2,357,837—Container Overcap & Method of Applying the Same (Nov.)
2,357,842—Container & Method of Forming Same (Nov.)
2,358,001—Container Filling Mechanism (Nov.)
2,358,421—Container Loading Apparatus (Nov.)
2,358,447—Bottle Crate Filling Machine (Nov.)
2,358,889—Method & Apparatus for Applying Closures to Containers (Nov.)
2,359,029—Valve Controlled Filling Machine (Nov.)
2,359,082—Filling Machine (Nov.)
2,359,562—Crown Crimper (Dec.)
2,359,576—Device for Opening Lids Hinged to Boxes (Dec.)
2,359,671—Filled Container Gassing Apparatus (Dec.)
2,359,766—Can Sealing Machine (Dec.)
2,359,793—Vacuum Closing Machine (Dec.)
2,359,785—Liquid Filling Apparatus (Dec.)
2,359,795—Can Body Forming Machine (Dec.)
2,359,932—Closure Applying Machine (Dec.)
2,360,198—Multiple Head Automatic Powder Filling Machine (Dec.)
2,360,313—Apparatus for Packing Cement or the Like Material (Dec.)
2,360,423—Apparatus for Applying Closures (Dec.)
2,360,435—Apparatus for Partially Folding Containers (Dec.)
2,360,510—Bagmaking Machine & Method of Producing Bags (Dec.)
2,360,565—Filling Machine (Dec.)
2,360,756—Material Diffusing Head for Container Filling Machines (Dec.)
2,360,845—Wrapping Machine (Dec.)
2,360,846—Machine for Making & Filling Packages (Dec.)
2,361,176—Article Feeding Apparatus (Dec.)
2,361,365—Method & Apparatus for Sealing Containers
2,361,366—Method & Apparatus for Sealing Containers
2,361,587—Method & Apparatus for Packaging Beverages
2,361,588—Method & Apparatus for Packaging Beverages
2,361,640—Process & Apparatus for Storing Liquids
2,361,641—Apparatus for Bottom Filling Containers
2,361,783—Method of and Apparatus for Assembling Plugs in Applicators

Paper

Paper, cellulosic sheet materials, fibreboard and corrugated board:

2,337,741—Package (Mar.)
2,341,415—Wrapper for Packages of Cigarettes & the Like (May)
2,341,492—Wrapper (May)
2,342,600—Bottle Wrapper (May)
2,342,969—Method of Wrapping Cheese & Product
2,342,977—Packaging (June)
2,344,470—Paper Treatment
2,344,482—Manufacture of Flexible Sheet Material
2,353,344—Shirt & Collar Protector
2,353,663—Package Wrapping
2,357,147—Wrapper for Bottles & Vials
2,358,246—Plastic Material Wrapper (Nov.)
2,359,271—Method of Making Packages (Nov.)

Tapes

Tapes, ribbons, cords and straps made of paper, cellulose, fabric and metal:

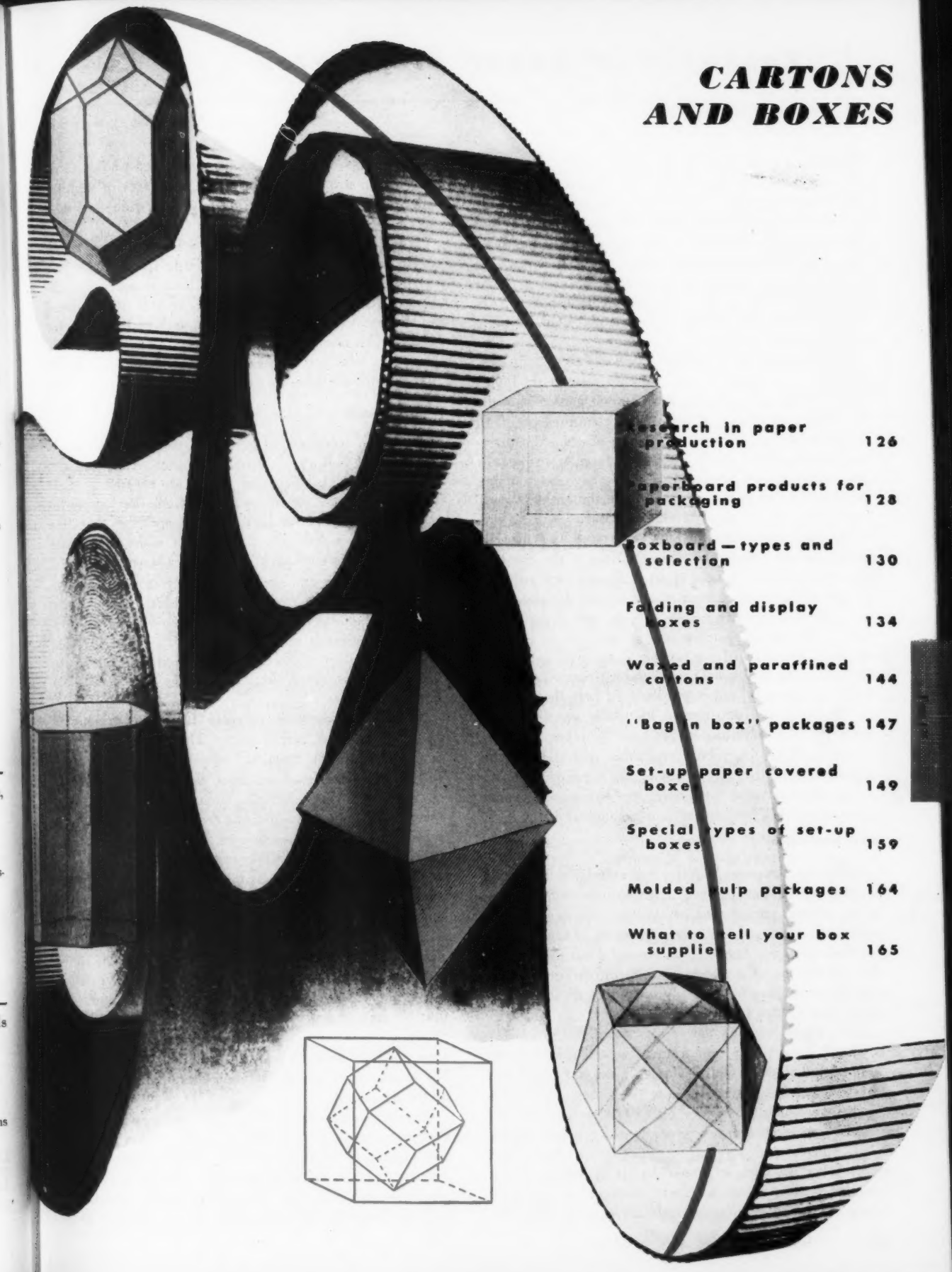
2,334,381—Method of Making Tear Strip Wrapper
2,342,098—Waterproof Elastic Thread & Fabric (May)
2,346,219—Automatic Pressure-sensitive Adhesive Tape Dispenser (July)
2,350,222—Cigar Band (Aug.)
2,350,369—Tape Roll & Core (Sept.)
2,361,673—Handle Forming Tape (Dec.)
2,361,730—Tape & Label Dispenser (Dec.)

Tubes

Tubes, collapsible and mailing, made of paper, metals and plastics:

2,333,812—Lipstick Holder (Feb.)
2,333,813—Lipstick Holder (Feb.)
2,337,264—Collapsible Tube (Mar.)
2,339,464—Collapsible Tube Holding & Dispensing Means (May)
2,341,601—Package for Fluids
2,341,835—Collapsible Tube (May)
2,342,976—Device for Dispensing Pastelike Commodities
2,352,384—Tin-coated Collapsible Tube (Sept.)
2,352,456—Collapsible Tube (Sept.)

CARTONS AND BOXES



Research in paper production 126

Paperboard products for packaging 128

Boxboard—types and selection 130

Folding and display boxes 134

Waxed and paraffined cartons 144

"Bag in box" packages 147

Set-up paper covered boxes 149

Special types of set-up boxes 159

Molded pulp packages 164

What to tell your box supplier 165

Research in paper production

by R. G. Macdonald

There is a great voice in the world today, the voice of science and technology. It is a voice heard since ancient times but never until today has it spoken with such authority, have its words been filled with promise, has it been listened to with such hope. And in no country in the world does the voice speak so eloquently as in our own." So stated Robert P. Patterson, Undersecretary of War at the Forum on Industrial Research recently held in New York City under the sponsorship of the Standard Oil Development Company.

This country in the postwar period faces many new problems in connection with the future trends in industrial research. All industries have become conscious of the increasing importance of research to continued progress. Research has become an accepted part of peacetime activity. It is important to all companies, large and small. In war, research facilities and experience have been among the chief factors in the enormous contribution of American industry in the prosecution of the war.

For many industries the war has served as a proving ground for the products of research. Much of this research represented many years of effort and much of it reflected the emergency need of improvising to meet current problems. Several industries such as pulp and paper found one of the major contributions of research to the war effort in the field of packaging. Postponed were most merchandising problems. Utility and use requirements became the criteria of paper products. At first, the problem of the paper and paperboard industries was the emergency job of substituting its products for other container materials. With tin, rubber and other materials on the critical supply list, paper was called upon to perform comparable services, otherwise the overseas shipping program would have been seriously handicapped.

Mass production

For years, the paper industry was essentially interested in mass production of a few major grades such as newsprint, tissues, paperboard, wrappings, glassine, writing paper, etc. These products were generally of high quality for their purposes, but their purposes did not require that they do the job of a metal drum, a tin can or a rubber bag. Paper by itself, obviously could not do these jobs. Something needed to be added.

Soon paper took on new appearances. When closely observed it became a new kind of coated sheet; sheets were pasted together with new adhesives; and added materials filled the spaces between the fibres. These new products consisting of paper plus additives began to do the wartime job. Soon new containers for paint, oil, tobacco, dehydrated vegetables, quick-frozen foods and many other products appeared. In all appearance these containers were paper. Lumber shortages brought into being the heavy containers made of V-board—the containers which had to do the job prescribed by the armed services to protect contents from the ravages of weather, sea water, insects, rats, and many other things encountered in world-wide shipment.

The challenge of the emergency was met and paper has been doing a big job for the fighting fronts. Then, for various reasons, paper gradually became a critical material. Other materials became less critical and returned to the packaging field—not as competitive products, for competition does not exist when every sinew of every industry is stretched to meet unending production needs, but as joint contributors to the united effort.

After the war

Recently, everyone has become conscious of the possibility of the end of this driving program. After the war, what? Industries, companies, others are breathing a new word—"postwar." In November 1944, the Packaging Institute met and, in the light of the knowledge that "the packaging man has available to him many new, man-made, war-born materials," conducted a session where the experts in aluminum, saran, modified wax coatings, synthetics and blends, Geon, glass and laminated films, foils, and papers, presented the merits of their respective products as packaging materials in war—or peace. It announced the start of the race—with a little chiding by the Chairman who noted the voice of the salesman again being heard.

These new salesmen reflected the old promotional spirit but talked a new language. The properties of their product were not "terrific, colossal or stupendous." Instead, they had a water-vapor permeability, a tensile strength, a porosity, a bursting strength, a water-resistance factor, etc.— new terms of great interest to the buyer, who remained to hear a discourse on the measurement of gas transmission through flexible materials.

The meeting indicated one thing, namely, that the packager of the future will have a number of industries working for him, each endeavoring to supply products that will most completely meet his use requirements and specifications, and at the lowest possible cost to him. He states at the meeting that he is in business to market the product within the container and will supply his customer with that product in a package which will meet not only his needs but also his prejudices. The material supplier, therefore, not only needs to sell his product to the packager, but he must also help to establish acceptance by the user of the container.

To meet the problems of the paper and paperboard industries, relative to wartime packaging, there has been much united effort on the part of related branches of the industry. Almost all branches have technical committees who meet and pool their knowledge toward certain objectives. There has not been time in the ordinary sense

to conduct research. The problems, being definite and immediate, called for overnight solution. Experience and knowledge of companies and individuals were drawn on to solve each problem as it presented itself.

Specifications had to be written by the government procurement agencies. These were based on use requirements and available materials. Paper or paperboard in some form has played a major part in most packaging specifications. Included in each has been required testing methods. Fortunately, the effort of the past decade found most industries ready with their basic methods of testing. The Technical Association of the Pulp and Paper Industry was particularly well prepared in this regard and made the package specification job relatively simple, insofar as the incorporation of suitable testing methods was concerned. To have had to take time out to develop such methods from scratch would have been time consuming, and generally unsatisfactory. Each procurement agency would have had its own methods and the supplier would have needed to learn a multitude of methods to have his products meet with the approval of the various buying groups concerned with materials in this field.

Technical packaging problems

The paper industry was further in a fine position to deal with the many technical matters relating to packaging. Aside from the efforts of TAPPI who, over the years, has built up a tremendous library of technical literature through its meetings and publishing facilities, and the immediate advisory help from specific industry technical committees, there was the Institute of Paper Chemistry at Appleton and the Forest Products Laboratory at Madison, Wis., with years of background in research and education experience to meet the new problems.

The Institute, an industry-wide supported establishment with personnel, equipment and valuable contacts, tailor-made to meet any technical problem relating to paper, became the clearing house for a host of research projects relating to paper in the war effort. One of these projects was carried through for the Weatherproof Corrugated Box Group, an organization that came into being because of the urgency for the creation of a new type of container to meet previously unheard of requirements.

The immediate purpose was to evaluate comparative performances of V-3-C, V-3-S and W-5-C fibre boxes. The adoption of code names for these types of boxes reflects the speed with which they were developed. They were the products of the combined efforts of the technical men in the corrugated box industry and allied fields who never before needed to give much consideration to salt water sprays and immersions, waterproof adhesives, etc. The joint effort reflected the spirit of the industry to join forces to meet a common problem in a hurry. The existence of the Institute with its testing facilities expedited the work under expert technical supervision.

It will be observed from the foregoing that most of the industry's packaging problems were solved in relatively short time because of the preparedness of its technical manpower. The Institute, through its higher education program had equipped a large number of chemists with the fundamental technical and research resources to meet the emergency problems and the Technical Association, through its years of effort in bringing together technical men, its building of a technical literature, and its intensive work in establishing testing methods provided a reservoir of knowledge and personnel that could meet the packaging program created by the immediate war needs.

Forest Products Laboratory and Ordnance

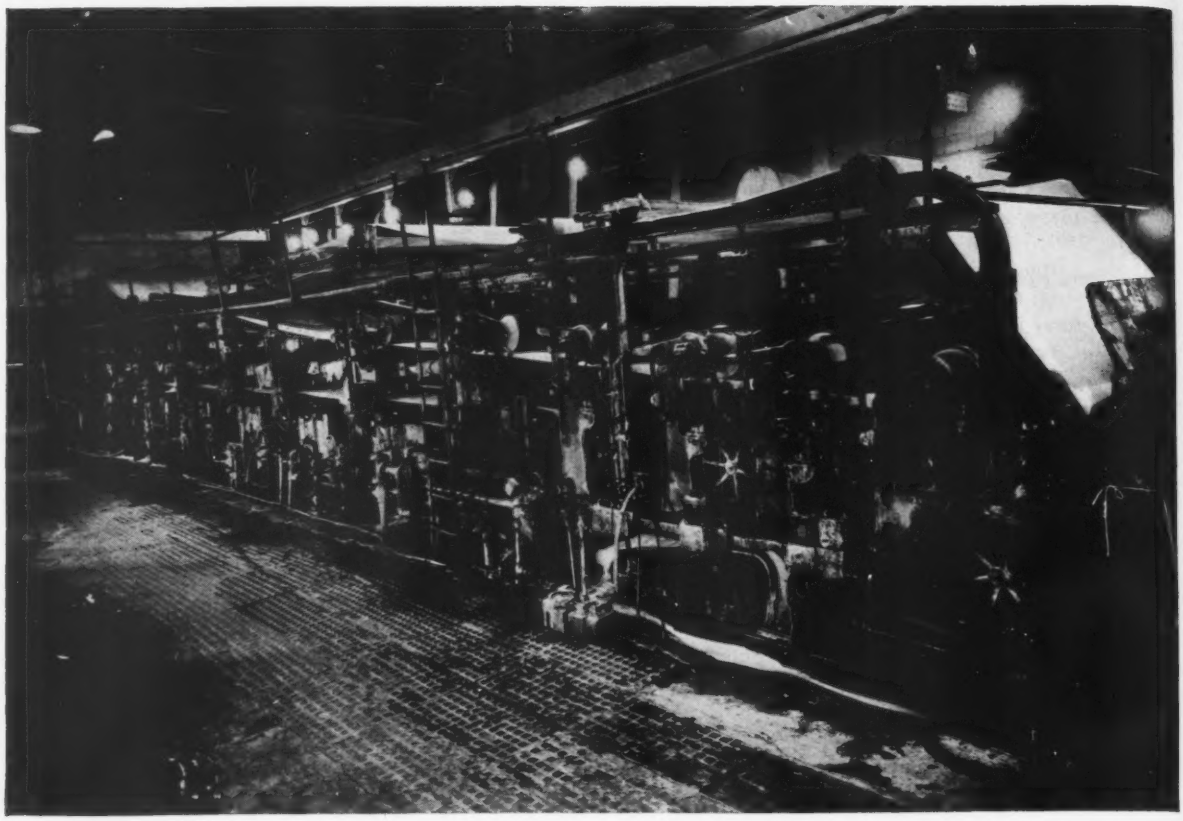
The Forest Products Laboratory, as a training and testing station for the Ordnance Department was well equipped and staffed to expedite the tremendous job of heavy container packaging. It established packing and packaging standards, showed packagers and Ordnance inspectors what constituted a good container and it policed the supply of products suitable for corrosion-resistant wrapping.

Following the war, many types of packaging materials will no longer be needed. Materials of all kinds will be available. Each will have many inherent advantages. Some will offer better protection than others. Of these, paper will probably be least expensive. However, cost alone is unlikely to be the deciding factor. Dehydrated and quick-frozen foods, to be acceptable to the public, must be delivered in a definitely prescribed condition. Full protection will be the No. 1 requisite, appearance of product and package and cost will be secondary, but important. Paper can provide the latter requirements as well as any competitive material, but everlasting research will be necessary to meet the challenge of the growing number of water-vapor-resistant films. The paper can vs. metal can or glass bottle, the corrugated or solid fibre carton vs. the wooden box, the multiwall bag vs. other containers, all demand constant research to decide the issue.

The paper industry differs from its competitive industries in the aforementioned competition largely by first being a group of industries within itself and second, by being made up of a large number of establishments. The sources of supply of basic materials for some industries are found in a handful of companies. More than 500 companies compose the paper manfacturing industry, apart from the huge converting industries. Of these, there are relatively few that consider themselves large enough to maintain sizable research organizations.

War developed cooperation

The war has demonstrated that competing companies can get together to develop products. The Technical Association, the Institute of Paper Chemistry, and the Forest Products Laboratory, the Bureau of Standards, and such educational institutions as the N. Y. State College of Forestry, the University of Maine and others, provide common meeting grounds to work together on problems common to many. The initiative and financing of these efforts must have the support of the enlightened executives of the industry and the encouragement of technical manpower will ensure the industry of competent and aggressive effort to reach its objectives.



Folding boxboard of gauge 0.16—0.045 can be turned out on this cylinder type paperboard machine at a maximum rate of 115 tons per day. The process begins with the entrance of pulp at one end of the machine. From the other end it emerges in 118-in. widths. Photo, Robert Gair Co., Inc.

Paperboard products for packaging

by J. D. Malcolmson

Principal constituents of wood are *cellulose* and *lignin*, in approximately equal quantities. The cellulose consists of tiny individual fibres which are tough and flexible and almost white in color.

The other constituent, lignin, is a dark cement which binds these fibres together and gives wood its hardness and structural strength. Lignin is of no value to the papermaker and must be cooked out and discarded in order to make available the valuable cellulose fibres. There are only a very few chemicals which will cook this lignin out economically without injuring the cellulose.

Classifications of wood pulp

Wood pulp is classified according to the manufacturing method by which it is produced. The two principal classifications are:

1. Groundwood or mechanical pulp
2. Chemical pulp

Groundwood pulp—Groundwood pulp is produced by grinding a peeled log against a revolving stone (natural or artificial). This constitutes the lowest quality of pulp manufactured because of the inferior strength, short length, and stiffness of the fibres and because of the impurity of the pulp. These bad qualities are due to the retention of all of the lignin. It is generally used in conjunction with some other longer-fibred pulp and finds its greatest use in the manufacture of newsprint, tissues, paperboard, and cheap magazine and pad papers. Picnic pie plates are 100% groundwood. Newsprint is about 85% groundwood. The yellowing and loss of strength of newsprint with age is due to the lignin in the groundwood. Occasionally the wood is steamed before grinding, which causes a better separation of the fibres. The woods commonly used in making groundwood pulps are spruce, hemlock, balsam, fir, aspen, poplar and willow.

Chemical pulps—Chemical pulps are produced by cooking the wood, which has been reduced to chips about an inch square, in large metal digesters with chemicals under high heat and pressure. This serves to separate the cellulose (or pure fibres) from the lignin and other

impurities. The impurities are dissolved in the cooking liquid and the degree of cooking determines the purity and also the physical characteristics of the pulp. Any of the chemical pulps may be bleached, which consists of whitening the pulps by the use of a bleaching chemical.

There are three principal kinds of chemical pulp:

1. *Soda pulp* is cooked with a solution of caustic soda (sodium hydroxide). It is a weak, soft, pure pulp used largely in book and magazine papers. It is seldom used in the manufacture of paperboard except for a small amount in the top liner of white patent-coated board. The woods commonly used are spruce, hemlock, aspen.
2. *Sulfite pulp* is an acid pulp, produced by a liquor which is a mixture of the bi-sulfites of calcium and magnesium. This pulp, which combines very high purity with good strength, is used in high-grade writing papers, book papers, folding boxboard, tissues, and also as the base for artificial silk and plastics. The "white patent coated" surface of folding boxboard is mostly bleached sulfite. Woods used for this are the same as for soda pulp.
3. *Sulfate pulp* is an alkaline pulp produced by gentler cooking with a mixture of caustic soda (sodium hydroxide) and sodium sulfide. It is stronger but less pure pulp, containing enough lignin to add cementing matter. *Kraft pulp* is an under-cooked sulfate pulp which is the strongest but the most impure sulfate pulp. Considerable success has been enjoyed in bleaching rather well-cooked sulfate pulp to make a very strong and very white sheet, with better bending qualities than sulfite stock.

   Bleached sulfate is often used for the top liner on corrugated facings or for sheet-lined board, but not for white patent coated board. The principal woods used for making this pulp are long-fibred conifers such as jack pine, southern pine, spruce, cypress, redwood, and larch.

Principal paperboard products of wood pulp

Paperboard is made as much as possible of old papers. Old papers contain the same fibres as new pulp yet they are cheaper. New pulp is added in sufficient proportion to bring the strength, bending quality and color up to the required standard.

Because of the existence of various grades of waste papers and pulp, and the multicylinder construction of a board machine, it is possible to produce an almost infinite variety of boxboards.

Among the most common of these are the following:

Chip—Made up almost entirely of mixed papers. Occasionally stronger fibres are added to produce *test chip*. The filler of most vat lined paperboards is chip.

News—Made of old newspapers. The gray color is due to disseminated printer's ink. News is usually used as the inner surface of other boards (e.g., white patent coated news back). Occasionally it is found that boards are made of *solid news*.

Manila—Name derived from manila rope fibres, but manila today contains no rope fibres. Boards and papers are still made of these fibres but the product is called "rope paper." Manila has come to mean a yellowish sheet containing 50% or more of groundwood.

Non-bending manila—About ⅔ groundwood, ⅓ unbleached sulfite, plus some yellow dye.

Bending manila—The same except that the proportions are about half and half.

Bleached manila—The same as the two listed above except that the yellow dye is omitted and some blue and red are added to neutralize the yellow of the groundwood.

White patent coated—Usually has a top liner made of bleached sulfite pulp, unbleached sulfite pulp, and some soda pulp. Waste paper from envelope factories, etc. (known as *hard white shavings* and *soft white shavings*), are substituted for the more expensive sulfite pulps wherever possible. The filler is usually chip.

Manilas—Patent coated and other grades can be colored in the beater (beater color) or on the calender (calender stain). They are then called yellow patent coated news, orange calender stained manila, etc.

Mist board—Usually has top of news, or news and sulfite to which has been added a certain amount of dyed kraft fibres.

Solid boards—Usually have a more expensive filler than chip. Examples are *solid sulfite* and *solid manila* (groundwood). Solid boards often have a top liner different from the filler, as for example, *white patent coated solid manila*.

Container boards—More attention paid to strength than to color whereas folding box boards (listed above) are more concerned with appearance and bending quality.

Test liners—Used on corrugated and solid fibre shipping containers must meet official Mullen test.

Jute liners—Test liners made from re-worked papers plus enough new pulp (usually kraft) to meet the required specifications on strength. Most of the new kraft pulp is concentrated on the outer skin or "top liner," and on the second layer or "under liner."

Kraft liners—Made of solid new kraft pulp, they are lighter in weight than jute but more expensive per ton.

Fourdrinier kraft liners—Made on a single wire screen and have no vat lined formation. They are lighter in weight than *cylinder kraft liner*. *Dry finish* Fourdrinier kraft liners are lighter in weight than *water finish* Fourdrinier kraft liners.

Filled kraft liners—Intermediate between *jute* and *cylinder kraft* in that they contain ¾ or more of new kraft pulp. The term is indefinite.

Corrugating sheets—Usually 0.009 in. thick and made of a variety of raw materials, the most popular of which are wheat straw and solid kraft. *Mill straw* consists of high-grade stock chemically treated for the purpose of increasing rigidity.

None of the above sheets contains adhesive, their only lamination being the plies of the vat lined sheets made on a cylinder machine. They can be combined with adhesives to other sheets to form an almost endless variety of combined products such as solid fibreboard, corrugated board, pasted chip, sheet-lined boards, caddy board, wallboard, and similar products.

Boxboard—types and selection

by Grafton Whiting

Folding cartons and set-up boxes are made from boxboard which is manufactured on a multicylinder paper machine. The function of this machine is to draw a film or web of fibres from each cylinder (usually 5—8 cylinders) and, by subsequent pressure, to form a compact sheet. Each cylinder turns in a vat supplied with the raw stock (about 1 per cent fibre and 99 per cent water) from which the board is to be made. This supply may consist of fibres reclaimed from waste paper, or of virgin pulp fibres, or a mixture of these according to the specifications of the board to be produced. The first and last cylinders form the two outside liners or surfaces of the board, while the remaining cylinders produce the filler, or inner plies. The thickness of each ranges from .002 of an inch upward, depending upon the adjustment of the machine employed.

Since any type of fibre may be furnished to the cylinders, and each cylinder forms a part of the construction of the board, a wide variety of boxboards can be made on standard equipment.

Boxboard grades

Certain grades of board are in common use for folding and set-up boxes. These are made of different materials and come different thicknesses, dependent upon the size and style of the box and the exact packaging use to which it will be put.

The thickness or caliper is expressed in thousandths of an inch—termed "points." Thicknesses may vary over a range of .012—.065 inch.

Table I lists the grades, together with caliper range and, in general, the materials from which they are most commonly made.

Waste papers, chief source of raw material, are sorted into many classes, each commanding a different price, according to the fibre content. Papers containing strong, white fibres bring the highest price and from there range downward to mixed papers, the lowest class. Pulp, although the average use is less in volume, is an important element in many finishes in producing the quality and surface effect required. There are three kinds of pulp in common use; namely, sulfite, sulfate or kraft, and groundwood. These may be unbleached or bleached and prices vary accordingly.

When the importation of European pulp was cut off in 1940, it was feared that the domestic and Canadian output would be insufficient to supply the market requirements. To meet this situation, the paperboard mills increased their usage of waste papers, particularly of the better grades, to substitute in part these reclaimed fibres for new pulp.

Although a critical shortage occurred during 1941, it was corrected in 1942. However the continued substitution in 1943 and 1944, together with increased production demands, brought a serious shortage to the point of forcing mills to shut down. Through nationwide appeal to save waste paper, this situation is now being rectified. However, this does not affect the tabulation of the mate-

Gauge lists published courtesy of the National Paperboard Association.

TABLE I.—GRADES OF BOXBOARD

GRADES	Caliper range in inches	FURNISH: Waste papers composed principally of: mixed papers	news	ground wood	sulphite fibres	old ct. rs.	Pulp: sulphite	kraft	ground wood	clay	Price index
FOLDING											
CHIP (BENDING)	.012–.050	x	x	..	..	x	..	..	..	..	110
MIST GRAY SUIT BOARD	.020–.040	x	x	..	..	x	x	x	..	..	130
MANILA LINED CHIP	.012–.050	x	x	x	..	x	x	..	x	..	130
BLEACHED MANILA LINED CHIP	.012–.050	x	x	x	..	x	x	..	x	..	140
KRAFT BOARD	.012–.050	..	..	..	..	..	..	x	..	..	130
WHITE PATENT COATED NEWS	.012–.028	..	x	x	x	..	x	..	..	..	160
CLAY COATED BOARD	.012–.028	..	x	..	x	..	x	..	..	x	220
BLEACHED SULPHITE BOARD	.016–.024	..	..	..	..	..	x	..	..	..	250
SET-UP											
CHIP (NON-BENDING)	.016–.065	x	x	..	..	..	..	..	..	..	100
NEWS VAT LINED CHIP	.016–.065	x	x	..	..	x	..	..	..	..	105
FILLED NEWS	.016–.065	x	x	..	..	x	..	..	..	..	110
SOLID NEWS	.016–.065	..	x	..	..	..	..	..	..	..	115
WHITE VAT LINED CHIP	.016–.065	x	..	x	x	x	x	..	x	..	130

NOTE: The proportion and selection of raw materials in a furnish may vary depending on availability of supply and quality required. Price index is based upon chip (non-bending) equal to 100%. The relation of other grades is only typical since the several materials entering into costs vary independently.

rials used, but refers only to the relative amount of each that is required.

Boards

Solid boards—General term indicating that the board is made of the same material throughout.

Filled boards—Board with inner plies of a stock different from that of the outer plies or liners.

Pasted board—Board made of two or more sheets of board or of board and paper pasted together by a subsequent operation.

Vat lined board—Board made on a cylinder machine where the first or last cylinder vat is supplied with a quality of stock which is different from that in the other vats.

Double vat lined board requires that both the first and last vats contain different stocks.

Color

Manila—Term used to indicate a color (yellowish) and appearance comparable to that formerly obtained when manila hemp (rope) was used.

Beater colored—Coloring material is added to the paper stock before entering the cylinder vat, thus impregnating the whole ply.

Calender colored (or stained)—Coloring material is applied to the surface of the board as it passes through the calender stack, thus coloring the top but not necessarily permeating throughout the ply.

Chemicals

Various chemicals, such as rosin and alum for sizing, are used in making boxboard to prevent the penetration of moisture. Starch is used for hardening and for stiffening the product.

Loading material, such as clay, is also used. Emulsions, such as asphalt for waterproofing, and dyes and pigments for procuring the desired color, are also employed. With these applied to the paper stock, any one or all of the plies may receive special treatment to suit requirements of the user.

Finish

Dry finish—Finish obtained when board passes through calender stack without receiving any special type of treatment.

Wet finish—Surface of the board is subjected to a water or steam bath in passing through the calender, which gives it a smoother finish. This is somewhat similar to dampening cloth before pressing.

Surface treatment—Treatment of the surface of the board may be made at the calender either before passing through the stacks or at some step in the operation. For example, silicate is applied to the board to prevent penetration of grease in the packaging of foods. Starch or other sizing is used to give a smoother finish for certain types of printing. Paraffin or wax is applied as a waterproofing agent where the board is to be used for the

No. 1 Gauge List—Non-bending Boards

1. Plain strawboard.
2. Plain chipboard.
3. Filled wood pulp.
4. Filled news board.
5. Single news vat-lined chip.
6. Single white vat-lined chip.

Regular number 50 lb. bdl.	Finish				*Weight per M sq. ft.*
	1	2	3	4	
Quan.	*Inch*	*Inch*	*Inch*	*Inch*	*Lbs.*
35	.065	.061	.058	.052	206
40	.057	.054	.051	.046	180
45	.051	.048	.046	.041	160
50	.046	.043	.041	.037	144
55	.041	.038	.036	.033	131
60	.038	.035	.033	.030	120
65	.035	.032	.030	.028	111
70	.032	.030	.028	.026	103
75	.030	.028	.027	.024	96
80	.028	.026	.025	.023	90
85	.026	.024	.023	.022	85
90	.024	.022	.021	.020	90
95	.023	.021	.020	.018	76
100	.022	.020	.019	.017	72
110	.019	.018	.017	.016	65
120	.017	.016	.015	.014	60

No. 2 Gauge List—Bending Boards

1. Single manila lined chip.
2. Bleached manila lined chip.
3. Double manila lined chip.
4. Colored boxboard chip back.
5. Bending chipboard.
6. Colored suit box chip back.
7. Mist color suit box chip back.
8. Cracker shell board.
9. Solid jute.
10. Any combination with chip, news or pulp back.

Regular number 50 lb. bdl.	Finish				*Weight per M sq. ft.*
	1	2	3	4	
Quan.	*Inch*	*Inch*	*Inch*	*Inch*	*Lbs.*
40	.052	.049	.047	.045	180
45	.047	.045	.042	.040	160
50	.042	.040	.038	.036	144
55	.038	.036	.034	.032	131
60	.035	.033	.031	.029	120
65	.031	.030	.028	.026	111
70	.029	.028	.026	.024	103
75	.027	.026	.024	.023	96
80	.025	.024	.023	.021	90
85	.023	.022	.021	.019	85
90	.021	.020	.019	.018	80
95	.020	.019	.018	.017	76
100	.019	.018	.017	.016	72
105	.018	.017	.016	.015	69
110	.017	.016	.015	.014	65
120	.016	.015	.014	.013	60

No. 3 Gauge List—Pasted Chip

Regular number 50 lb. bdl.	Finish		*Weight per M sq. ft.*
	Rough	*Smooth*	
Quan.	*Inch*	*Inch*	*Lbs.*
10	.216	.206	720
15	.144	.138	480
20	.108	.103	360
25	.086	.081	288
30	.070	.065	240
35	.060	.058	206

No. 4 Gauge List—Solid News Solid Wood Pulp

Regular number 50 lb. bdl.	Finish				Weight per M sq. ft.
	1	2	3	4	
Quan.	Inch	Inch	Inch	Inch	Lbs.
40	.061	.058	.053	.049	180
45	.054	.052	.048	.043	160
50	.049	.047	.043	.039	144
55	.045	.043	.039	.035	131
60	.041	.039	.036	.032	120
65	.038	.036	.033	.030	111
70	.035	.033	.031	.028	103
75	.032	.031	.029	.026	96
80	.030	.029	.027	.024	90
85	.028	.027	.025	.023	85
90	.027	.025	.023	.021	80
95	.025	.024	.022	.020	76
100	.023	.022	.021	.019	72
110	.021	.020	.019	.017	65
120	.019	.018	.017	.015	60

No. 5 Gauge List—Pasted Solids News Board

Regular number 50 lb. bdl.	Finish		Weight per M sq. ft.
	Rough	Smooth	
Quan.	Inch	Inch	Lbs.
10	.233	.196	720
15	.156	.130	480
20	.117	.098	360
25	.094	.078	288
30	.078	.065	240
35	.066	.056	206

No. 6 Gauge List and Ream Weight Table Patent Coated and Solid Manila Board

1. Patent coated, solid manila back.
2. Patent coated, news back.
3. Patent coated, news center manila back.
4. Patent coated, chip back.
5. Patent coated, blue or color back.
6. Solid manila board.

Caliper of individual sheets	Weight Per 500 Sheets			Weight per M sq. ft.
	25 × 40 (1000 sq. in.)	24 × 36 (864 sq. in.)	28 × 24 (1232 sq. in.)	
Inch	Lbs.	Lbs.	Lbs.	Lbs.
.011	178	154	219	51
.012	194	168	239	56
.013	211	182	260	61
.014	219	189	270	63
.015	226	195	278	65
.016	241	208	297	69
.018	266	230	328	77
.020	284	245	350	82
.022	306	264	377	88
.024	333	288	410	96
.026	361	312	445	104
.028	389	336	479	112
.030	417	360	514	120
.032	444	384	547	128
.034	472	408	582	136
.040	556	480	685	160

packaging of liquids or semi-liquids. It is common practice in folding-box plants to coat with paraffin or wax for this same purpose.

Standards

Standard rules and regulations have been adopted by the National Paperboard Association, representing the manufacturers of folding and set-up boxboards.

The basic facts for establishing the standards, and other information, were obtained from investigations of practices in large and small boxboard mills scattered over a wide area. Following this survey, conferences were held by makers of board, fabricators of folding and set-up boxes, and consumer organizations, and there a series of standard gauge lists was evolved; also a set of definitions which met with general approval. These gauge lists are identical with Simplified Practice Recommendation R44-36, entitled *Box Board Thicknesses* (United States Department of Commerce; effective December 31, 1936). Gauge lists are given in this article.

The set of definitions and the gauge lists for boxboard are as follows:

Standard Sizes—In all grades, a sheet 25 in. by 40 in., containing 1000 sq. in.

Patent-coated or manila boards (see List 6) are also shown in sizes 24 in. by 36 in., containing 864 sq. in. and 28 in. by 44 in., containing 1232 sq. in. The standard sizes are used as bases for all computations.

Standard package—In patent-coated or solid manila board, a ream of 500 sheets.

These grades are sometimes packed, for convenience, in fractions or multiples of a ream, depending upon the size of the sheet.

Bundle—A unit containing 50 lb.

The quantity of sheets varies with the size and the caliper, but the weight of 50 lb. of board is fixed.

Regular numbers—The quantity of standard sized sheets (25 by 40) of boxboard necessary to make a bundle of 50 lb.

Count—The quantity of odd-sized sheets required to make a bundle.

For the standard size (25 by 40) the count would be identical with the regular number; therefore it has become the custom to use the term "count" to apply only to odd-sized sheets and "regular number" to standard size. The count for an odd-sized sheet is found by dividing the area of the corresponding regular number by the number of square inches in the odd-sized sheet.

Finish—Four standard finishes designated as No. 1 to 4, from lowest to highest.

The degree of finish is regulated by the pressure exerted on the calenders under which the board passes. The pressure determines the density of the sheet. The resulting surface is incidental, but it becomes smoother as calender pressure is increased.

No. 1—Light pressure results in a rough surface and low density. It gives large sheetage for its weight; i.e., it gives greatest area to pound of board.

No. 2—Medium pressure—fair surface and sheetage. Popular for ordinary printing and general utility purposes.

No. 3—Heavy pressure—smooth surface and low sheetage. Used largely where better printing surface is required.

No. 4—Heaviest pressure—extra-smooth and slick surface, dense body and firm compact fibres. It has the lowest sheetage.

Rough—Smooth—where but two finishes are used, these relative terms designate light or heavy weight board in caliper points.

Dimensions—Width in inches given first, then length. Width is the measurement across the machine, i.e., space between knives in the slitter. Length is always the measurement in the direction of the grain, i.e., the space between cut-offs.

Bending—Any board which, when properly scored and folded, shows no break in the outer fibres.

Gauge lists

Gauge Lists 1 to 6 give in the first column the regular numbers or quantity of standard-sized sheets in a bundle weighing 50 pounds. The figures in the other columns give the caliper (decimals of an inch) when made with the finish indicated.

Thus Gauge List No. 1, first line, column 1, shows regular number 35, meaning 35 standard-sized sheets to the bundle. Column 2 gives the caliper of .065 in. as the thickness of No. 1 finish; column 3, .061 in. for No. 2 finish; and so on.

Gauge List 6 states the caliper in the first column, and to the right of it, the weight of a ream of 500 sheets. Three sizes of these sheets are listed with their corresponding weights.

The weight per M sq. ft. is also shown on each list.

Special surfacings

Boxboard is taken from the paper machine either in rolls or in sheets, cut to specified size, and may be further processed to give a special type of surface. Where the equipment is so arranged, some of these operations may be continuous with the paper machine while others are treated in a separate division. Following is a description of some finishes:

Clay coated—Clay, with casein as an adhesive, is applied as a coating to boxboard and, with subsequent calendering, produces an excellent color and brightness. It is the highest standard grade of board and is used largely for the better quality of folding cartons.

Grained—An imitation oak, leather, marble, or other finish may be given to a boxboard by passing it through printing cylinders appropriately engraved.

Lined or Pasted—Any boxboard may be pasted to another or lined with a plain or fancy cover paper, parchment, glassine, or other material, either in the roll or in sheet form. Asphalt, properly prepared, or other adhesives, may be used to make the board practically waterproof. Pasted board may be built up to any desired thickness and made to serve a number of uses.

Table II shows general types of boxes (column headings) and the grades of board (at the left) from which they may be made. Such a statement is necessarily based upon averages, since styles of boxes vary the same as styles in clothing, and poorer or better grades may be supplied to meet the desire of the buyer.

TABLE II.—TYPES OF BOXES

BOXBOARD GRADES	BUTTER BOXES	CANDY BOXES	CEREAL CARTONS	CIGARETTE CARTONS	COSMETICS	DRUGS (BOTTLED)	DRIED FRUIT CARTONS	EGGS (LOCAL DELIVERY)	ENVELOPES (STATIONERY)	5-CENT CANDIES	FLORISTS' BOXES	FROZEN FOODS	HARDWARE	ICE CREAM	JEWELRY BOXES	LIQUOR (BOTTLED) CARTONS	MILK BOTTLES	SALT CARTONS	SHOE BOXES	SOAP (FLAKES)	SAUSAGES, BACON, ETC.	SUIT BOXES	STOCKING BOXES	TOOTH PASTE CARTONS	VEGETABLE AND FRUIT CARTONS
CHIP (BENDING)	..	x	x	..	..	..	..	x	x	..	x	..	..	..	..	..	..	..	..	..	..	x	..	..	..
MIST GRAY SUIT BOARD	..	..	..	..	..	..	..	..	x	..	x	..	..	..	..	..	..	..	..	..	..	x	..	..	..
MANILA LINED CHIP	..	..	..	..	..	x	x	..	..	..	..	..	x	..	..	..	..	..	x	..	..	..	..	..	b
BLEACHED MANILA LINED CHIP	..	..	x	x	..	x	b	x	..	x	..	..	x	..	c	..	..	b	..	a	a	..	..	..	..
KRAFT BOARD	..	..	..	..	..	..	..	..	..	..	x	..	x	..	..	..	..	..	..	..	..	..	x	..	..	b
WHITE PATENT COATED NEWS	..	..	x	x	..	x	..	..	..	..	..	..	..	..	..	x	..	..	..	..	a	a	..	..	x	..
CLAY COATED BOARD	..	..	..	x	x	x	..	..	..	..	..	..	..	..	x	x	..	..	..	..	a	a	..	..	x	..
BLEACHED SULPHITE BOARD	a	..	x	..	..	..	..	..	..	..	..	b	..	b	..	..	b	..	..	..	..	a	..	..	..	..
CHIP (NON-BENDING)	..	c	..	..	..	..	..	..	c	..	c	..	x	..	..	..	..	c	c	..	..	..	c	..	..	..
NEWS VAT LINED CHIP	..	..	x	..	..	..	..	x	x	x	..	..	c	..	..	..	..	..	c	..	..	..	c	..	..	x
FILLED NEWS	..	..	..	..	x	..	..	..	..	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..	..	..
SOLID NEWS	..	..	..	..	..	..	..	x	c	..	..	..	x	..	..	..	..	..	..	..	..	..	..	..	..	..
WHITE VAT LINED CHIP	..	c	..	..	c	..	..	..	..	..	..	..	..	..	c	..	..	..	..	..	..	..	..	..	..	..

a—greaseproof, b—waterproof, c—lined with cover paper.

NOTE: The boxboard selected for any type of product may vary from a high to a low grade depending upon the service required of it, the price, and the degree to which the sales appeal in the appearance of the package is a factor in the merchandising policy.

Folding and display boxes

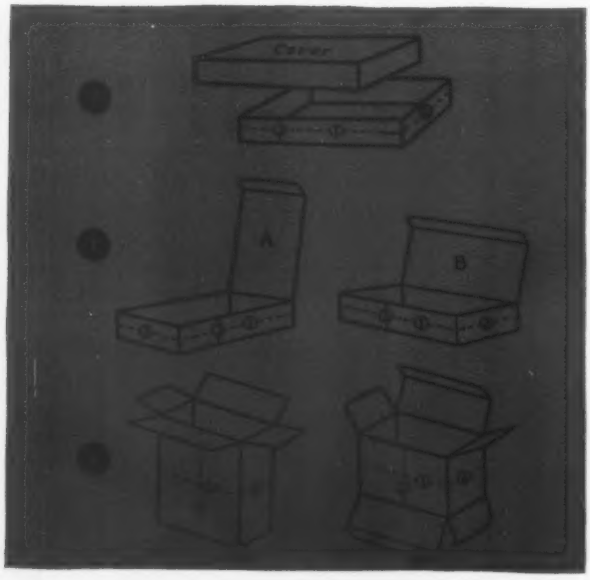
Infinite variety, as can be seen in the illustrations on the pages which follow, is the most notable characteristic of the folding paper box. Literally hundreds of variations in style and construction have been developed to meet the merchandising needs of the great assortment of products packaged in these containers. However, the illustrations in this section cover all of the important styles of cartons.

Because of patent restrictions, not all of these can be manufactured by any one company. Patented cartons have been so designated, and information on the patent for any given box can be procured by writing to the regular box manufacturers.

In addition to styles in construction, other factors offer the user of cartons a wide choice. Boards, for example, come in a variety of grades, colors and thicknesses, as described elsewhere in this volume. The carton may be printed in a number of colors by either letterpress or lithography.

A variety of special treatments either of the board or the printed carton may give it specially desired characteristics. Varnish, lacquer, paraffin or cellulose film may be applied or the board may be embossed. The manufacturer of cartons is in a position to explain these processes and advantages in all details and to recommend those decorations which are most desirable.

Basic carton types: 1—Tray carton is open on one plane, formed by folding sheet of board to make side panels. Corners are glued or locked in place. Most two-piece boxes are two trays fitted together. 2—Top-opening carton is similar to tray except that one side panel is extended and folded to cover open plane. This carton may be tucked, locked or glued to form closure. 3—End-opening carton is basically a tube with one or both ends folded and sealed, locked or tucked for closure.



Specification data

Purchasers can avoid much trouble by giving complete information at the earliest opportunity. The following points should be specified:

1. Stock: Description of type of board to be utilized
2. Caliper or thickness of the board
3. Dimensions: This, of course, is of vital importance —the proper method is explained under "Basic Styles" below
4. Engravings (whether furnished by purchaser, on hand, or to be made and billed as an extra charge)
5. Colors: Specific naming of colors, preferably by some one of the standard systems, with mention of any peculiarities in use, such as fastness to sunlight or exposure to alkalies
6. Printing (whether letterpress or lithography)
7. Copy and proofs (including opportunity to check them before final printing)
8. Surface protection (i.e., varnishing, lacquering)
9. Packing and method of marking container to facilitate inventory and factory re-use
10. Delivery or shipping instructions

Basic styles

All folding boxes are derived from three basic types as illustrated at the left; numbers on each diagram show the proper method and order of specifying dimensions. This method is recommended by the Folding Paper Box Association of America. All measurements should be from center of crease to center of crease.

Each of the illustrations on the following pages comprises two panels. At the right is the photograph of a completed carton, exactly as it would appear in use. At the left is a photo-diagram of the same carton, flat and unprinted, showing its construction and proportions. The solid lines indicate lines for scoring edges; dotted lines indicate perforations or scores intended for tearing or opening of the container; cross hatching indicates glued seams.

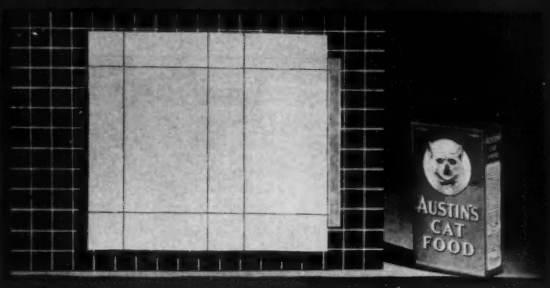
All of the diagrams are photographed against a one-inch scale which forms the squares appearing as backgrounds for the cartons.

The various styles are arranged under the three classes shown in the diagram. Also, there are illustrated some two-piece boxes, each of a different basic type; several styles of carriers for bottled beverages; and a number of display stands.

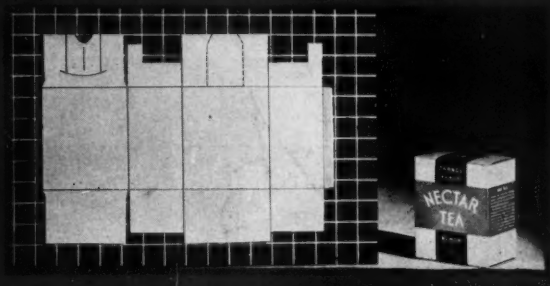
Some of the styles may be out for the duration—but they will be back!

Class A: end opening

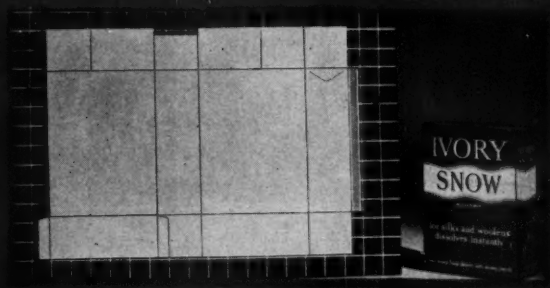
1—**SEAL-END CARTON.** The most popular style carton for packing flour, cereals, sugar, salt, teas, coffees, spices, soap powders and a wide variety of products. Readily packed on high-speed automatic machinery but difficult to seal by hand.



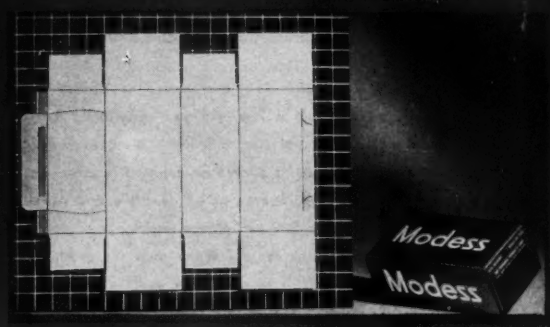
2—**SEAL-END CARTON WITH POURING SPOUT.** Seal-end carton, same construction as No. 1 with the additional feature of the patented pouring spout. This pouring spout makes it possible to dispense contents easily without spilling and affords a means of re-closing. Patented.



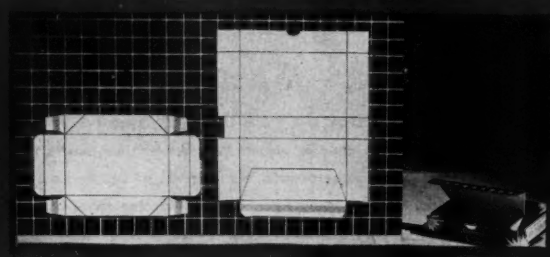
3—**SEAL-END CARTON** for automatic packing and sealing. It is similar to No. 1 except that it has incorporated in its construction additional flaps on the bottom of the carton to prevent sifting. This carton is particularly suited for products which are milled or pulverized to such a degree that particles would sift through the regular seal-end carton. This carton also has a unique pouring spout, which is formed by breaking the perforations in the top of the side panel. Patented.



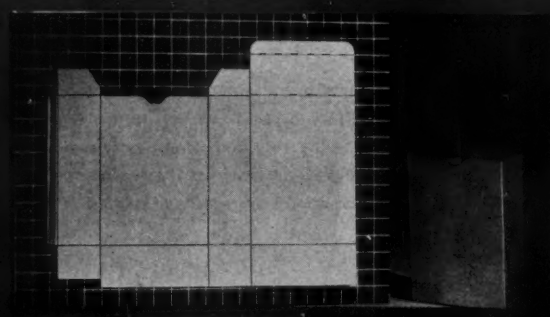
4—**SEAL-END BROADSIDE OPENER STYLE.** An interesting development in a seal-end carton which permits inexpensive, automatic filling through the ends of the carton which are later securely sealed. Carton is opened on the broad side, hence the name "Broadside Opener." Patented.



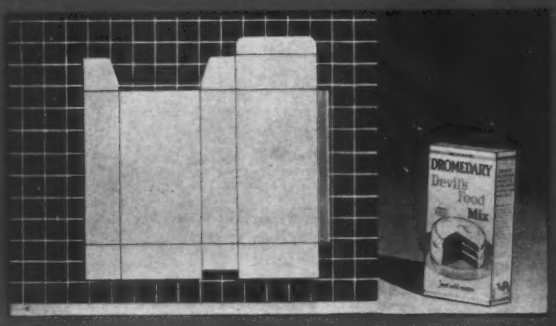
5—**TWO-PIECE BROADSIDE OPENER.** This is a variation of style No. 4 and is primarily used for the packaging of small pieces such as cube sugar. The individual pieces are first packed into the tray which is then easily inserted through the end of the outer carton. The outer carton is sealed automatically. The consumer can readily open the carton by breaking the spotted glue seam and tearing perforations. The container can be re-closed by the consumer by treating the hinged opening as an ordinary tuck flap. Patented.



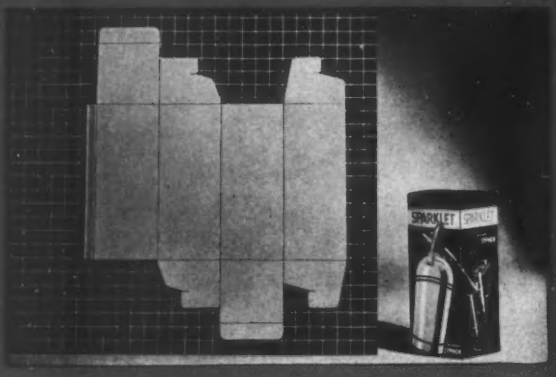
6—**TUCK-TOP, SEAL-BOTTOM SHELL WITH TIGHT WRAP.** Consists of a plain shell, often made of chip board, completely covered by a printed wrapper. Widely used for cereals and crackers. Requires automatic machine equipment. Outer wrapper prevents sifting, air deterioration and contamination from insects or dust. Newest development is to paraffin the printed side of wrap to give added protection to product. Wrap may be glued solidly to all six surfaces of the carton or "spot glued" at certain points.



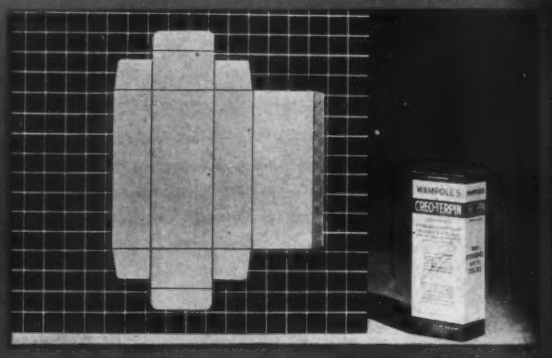
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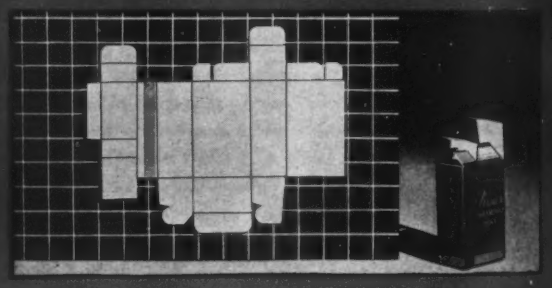
7—TUCK-TOP, SEAL-BOTTOM CARTON. *Has the advantage of a solidly sealed bottom and convenience of the easily opened and closed tuck top, for ready accessibility to contents. Best suited to automatic packing because of difficulty of sealing bottom by hand. Note essential similarity to No. 6 with the exception of the use of printing directly on the carton blank.*



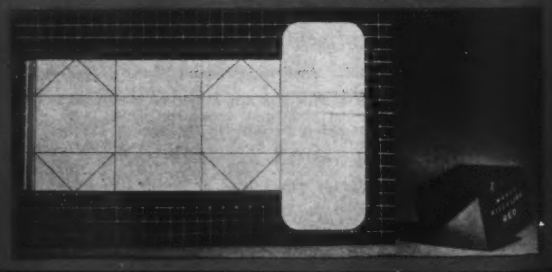
8—REVERSE-TUCK CARTON. *The most widely used of all carton styles for low-priced articles of all kinds. Easily set up by hand and adaptable to automatic packing. Convenient to open and close and exceedingly economical in manufacture because cartons interlock. This style not suited for heavy products, which must be held securely in the carton and require some positive means of locking the end tucks, or for powdery products, such as flour, salt and sugar, which are likely to sift through and thus require a seal-end carton. Ready accessibility and low cost make this style carton ideal for five- and ten-cent units of candy, such as cough drops, as well as shaving creams and tooth paste in tubes. Type illustrated has special locking side flaps known as "Arthur Locks."*



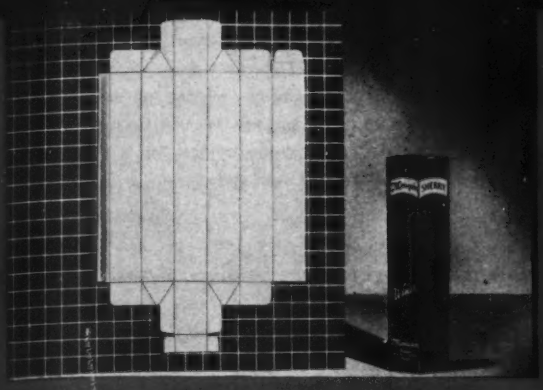
9—STRAIGHT-TUCK CARTON. *This carton has no advantage over reverse-tuck carton, but is required and extensively used with high-speed automatic cartoning machines. Must be made with right and left glue seams to secure economy of interlocking for economical manufacturing. Serves as an effective and satisfactory low-price package for the same large variety of products using the regular reverse-tuck carton. When used for products packaged in glass bottles, it is advisable to equip the bottom flaps with a positive locking device to insure against the possibility of the bottle falling out of the carton. Inserts or corrugated liner may be used for added protection of the product.*



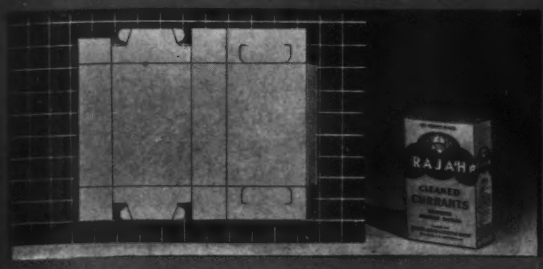
10—STRAIGHT-TUCK CARTON, "2 in 1" STYLE. *Patented carton made with an inside divider which, when folded into position, forms two separate compartments. Made in one piece, delivered in conventional knocked-down form. An ideal carton for a combination sale, such as a shampoo and a hair tint, or a bottle with medicine dropper or dispensing unit.*



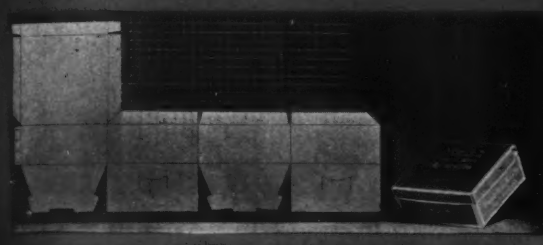
11—BELLOWS-END CARTON. *Web-end construction forms a strong and tight end closure by hand assembly. Carton may be opened and tightly reclosed at will. Note simplicity of construction. Web-end construction provides substantial protection against sifting when granular or crumbling products are packed in this type of carton.*



12



13



14

12—HEXAGONAL CARTON: TUCK TOP AND LOCK BOTTOM. *A patented carton that combines novelty with ease and speed of setting up. Quick-closing top requires only a single tuck or flap, while the Hibson lock bottom ensures a permanent seal. Capable of holding the weight of a comparatively heavy inner package, such as a bottle of wine, liqueur or any other product packed in glass. Types of this sort are extensively used for display purposes and for seasonal promotion of products ordinarily merchandised in their glass containers alone.*

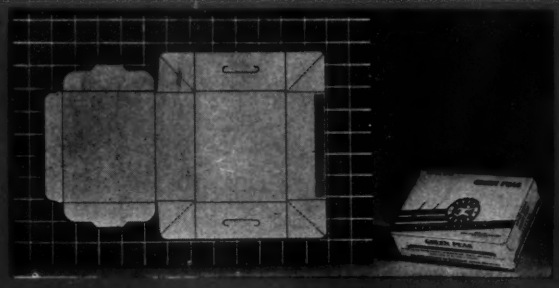
13—GREENLEAF LOCK CARTON. *Locks at each end securely. Widely used for packing dried fruits and other heavy bulky products. Also serves as a packer or carrier unit for a number of individual cartons. Locks of this type provide sufficient strength to support a comparatively great inner package weight, yet are so constructed as to permit of fairly frequent opening and re-closing by the consumer.*

14—QUIKLOC STYLE CRACKER CADDY. *Originally a caddy was a container for bulk goods which were dispensed in small units. Illustration shows a very popular model which will accommodate several pounds of crackers. One-piece collapsible construction with patented bottom which is quickly set up. Two corners of cover require metal stitching by user. Note how the construction of the bottom flaps provides a multilayer bottom when the caddy is erected. Patented.*

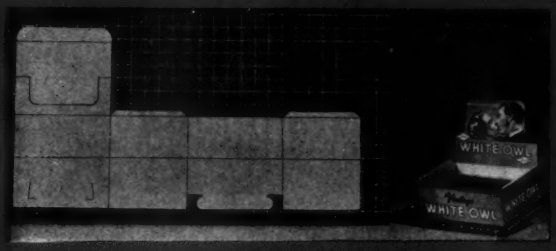
15—ONE-PIECE WEB ENDS AND SNAP LOCKS. *This carton, delivered in glue tube fashion, is easily and quickly assembled. The carton shown was primarily developed for frosted foods, which require tight end closures and ease and speed in packing. It is well suited for various other types of products which require features mentioned above plus economy. Patented.*

16—PANEL-FOLD DISPLAY CONTAINER WITH LOCK BOTTOM. *Simple in construction and setting up. Cover is so arranged as to make an attractive display panel. Protective cover is optional. Stands flat on the counter and provides good visibility to the displayed items. Requires printing and coating on only one side of the board.*

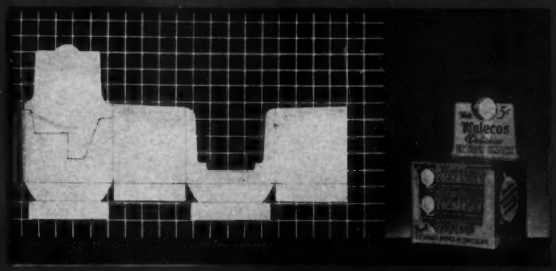
17—BROOKS TWIN DISPLAY CONTAINER. *This container has a lock bottom low front, with a pivoting swing display card. The display card is designed to give the effect of printing on two sides. This effect is gained by twisting the card 180° when display is set up.*



15

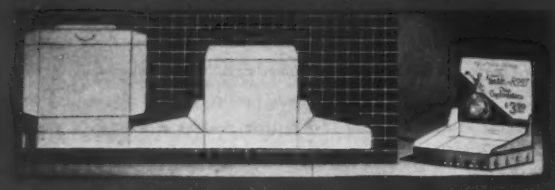


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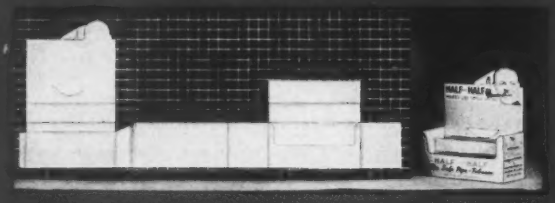


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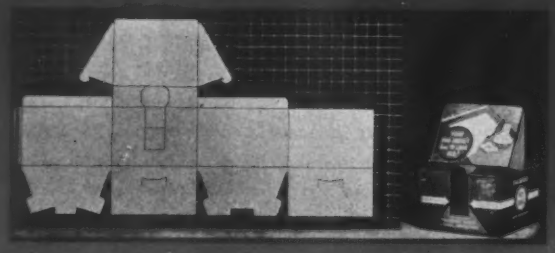
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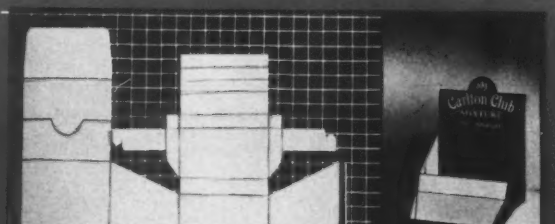
18—BROOKS TILTING DISPLAY CONTAINER. *This style is equipped with a rear tab which the dealer elevates and secures in the rear panel, effectively displaying the merchandise at a desirable angle. This tab may be seen as indicated in the diagram-photo, upper left-hand corner. This is a patented display container type of construction.*



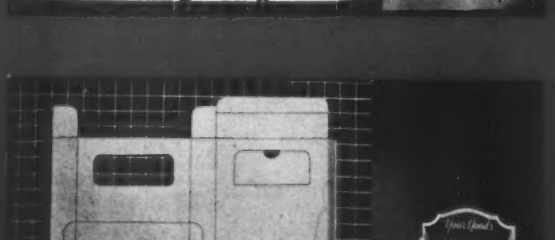
19—TWO-STEP DISPLAY CONTAINER. *Patented display which shows products in two steps or tiers. Made in one piece, shipped flat. Easily set up by pushing down on two upright pieces which are scored to form the steps. Requires protective sleeve for shipping filled with merchandise. A simple, attractive display unit of sturdy construction and good counter stability.*



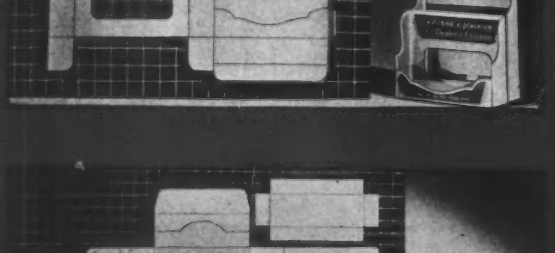
20—COUNTER DISPLAY DISPENSER. *A novel container in which the display panel, customarily placed at the back, is placed somewhat forward, so that only a few of the articles are displayed, the greater number being behind the display panel, from which position they are dispensed. Avoids disorderly appearance of partly filled displays after a few units are sold. This device is unsuitable where mass display is the desired merchandising method.*



21—FRONT-PANEL, LOCK-BOTTOM DISPLAY CONTAINER WITH POCKET. *An ingenious display by which contents are sold from the stock packed in the main portion of the container, while the pocket front permits an effective continuous display of the actual article. Prevents unsightly gaps in the display line, which is a weakness in many display containers. Note how the pocket front hangs below counter level or level of step on which main portion of display rests.*

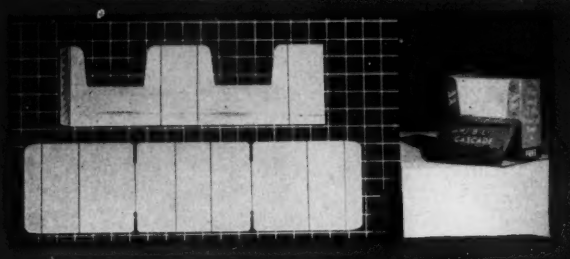


22—SKYSCRAPER (BROKEN BACK) DISPLAY CONTAINER. *Patented container for displaying products in two tiers in an upright or "skyscraper" manner. Made with easel to hold second tier in raised position. Scored in center so that for shipping it folds up, but is readily set up for display by the dealer. When folded for shipping, the two halves of the unit so interlock as to form one flat, rectangular carton with all merchandise protected on all sides.*

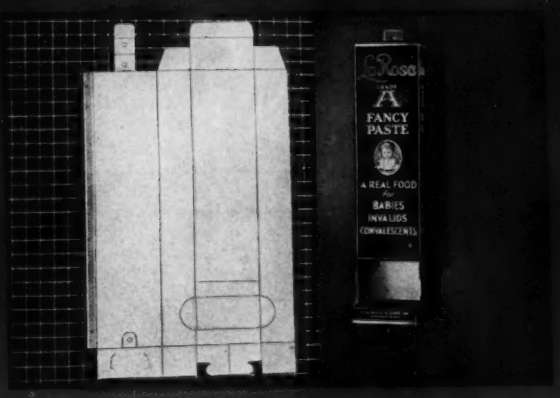


23—CENTER-DIVIDER DISPLAY DISPENSER. *A straight tuck end carton with center divider forming two compartments. Readily filled, products falling into position with removal of bottom one. Stands erect on counter or may be hung on wall. Center divider construction a patented feature. Important considerations in planning dispensers of this type are: (a) provision of ample opening for withdrawal and (b) provision against "jamming" of product in reservoir tower. Both are easily provided for with a bit of foresight.*

24—FREE PAMPHLET DISPENSER. *This construction is easily set up on the dealer's counter ready to serve as a dispenser of pamphlets, advertising media or similar material. Its two-piece construction, simple and unique, is extremely inexpensive, and provides an economical means of shipping and distributing free literature. Note that the unit faces both ways—permitting use on island counters.*

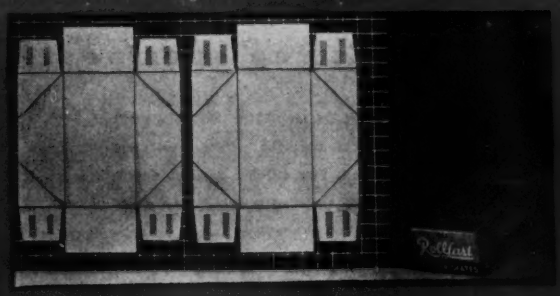


25—HANGER DISPENSER. *This high, narrow dispenser holds a single row of packages, piled one on top of another, with an opening at the bottom through which they are easily withdrawn. Occupies minimum space on crowded drug store counters or may be hung on the wall or other available space. Note top and bottom hanger tabs, provided as an integral portion of the display carton blank.*

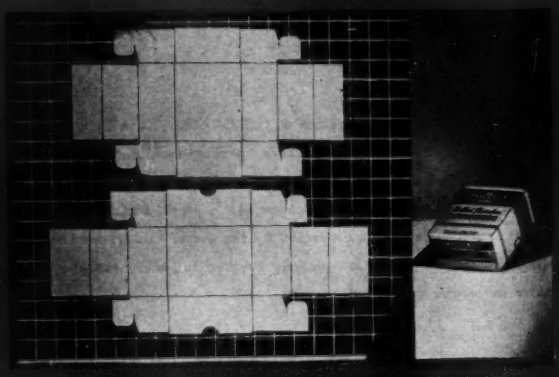


Class B: tray

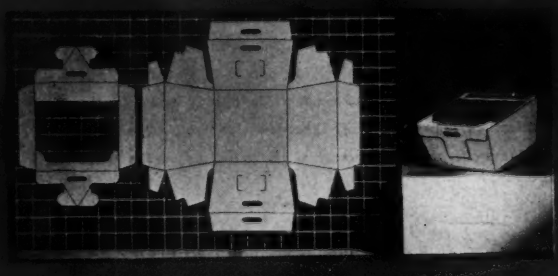
26—TWO-PIECE FULL TELESCOPE CARTON. *These cartons are glued in collapsible form by carton manufacturer and shipped to user in that manner. Quickly set up by infolding to an upright position. Note that top half of container is slightly larger in all dimensions than lower or bottom half. This permits of telescoping without distortion of the container. Size, in such instances, must be accurately controlled to provide a tight—but not too tight—fit.*



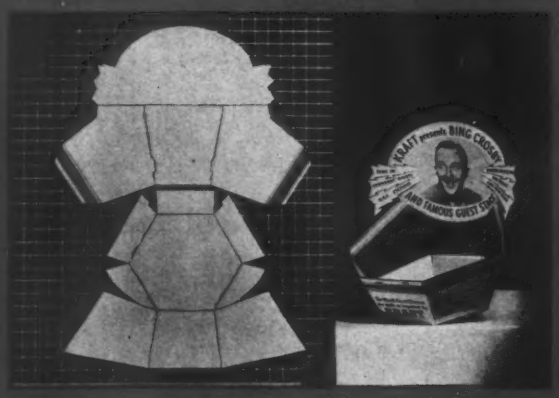
27—TWO-PIECE TELESCOPE CARTON WITH OVERLAPPING ENDS. *This style carton assembled and folded by hand. Ends overlap and are held against the side by friction, but may be glued for additional reinforcement. A development of the overlapping end carton is an extra length tab provided as an additional protection on the top and bottom. A similar reinforcement along the sides can be provided for strength.*



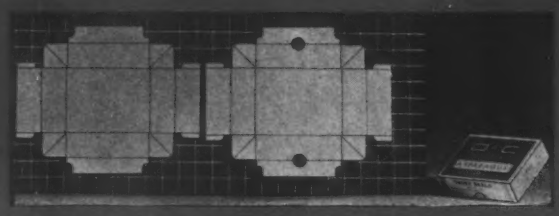
28—BERRY AND VEGETABLE CARTON. *This type of carton has proved its adaptability to replace the ordinary wooden basket used for berries, small fruits and vegetables. Overlapping sides are wire stitched to set in proper position for use. Raised bottom and slotted sides ensure proper ventilation for contents. Can be equipped with transparent window cover with locks to hold it securely. Patented.*



XUM



29



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29—BASKET DISPLAY CONTAINER. *The display panel has been creased so that it can be folded to fit a shipping case. This does not interfere with the rigidity of the panel when on display as the panel is then forced into a curved position.*

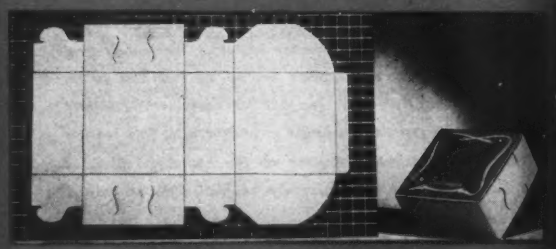
30—TWO-PIECE SIMPLEX STYLE CARTON. *A carton construction which is rigid, easily set up and free of locks or tabs on the exterior surfaces. The web corner construction prevents leakage when packing frosted foods. This style is also adaptable for shoes, textiles and other types of products requiring a two-piece carton. Patented.*

Class C: top opening

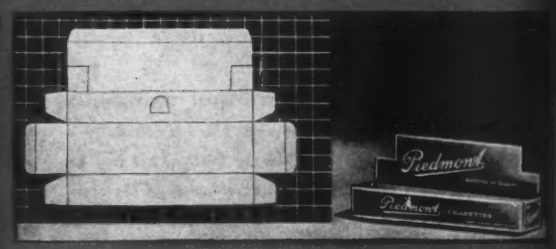
31—ONE-PIECE CARTON WITH FOUR HOOK CATCHES. *Economical for use in local bakeries where small quantities of several sizes are required. Two catches on each end hold carton upright. This style is not sufficiently durable to stand long distance transportation or rough handling, but is used by bakeries for packaging cake sold in their own retail stores and carried home by consumers. Also used on routes for delivery-trucks-to-consumer purchases in which case it is frequently made with a window of transparent cellulose.*

32—ONE-PIECE BRIGHTWOOD STYLE CARTON. *A widely used one-piece carton for large-scale production. Automatically formed, glued along the vertical panels, filled and sealed by Brightwood machines in the package user's plant. Definite economies in packaging can be effected by the use of this style carton if sufficient production is regularly handled to justify the use of this automatic equipment.*

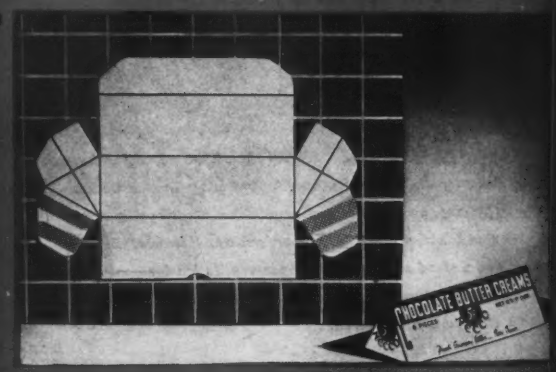
33—TRIANGULAR CARTON. *This carton is received in a glued knock-down form. It is easily assembled for filling by pushing the ends inwardly. After filling, the carton is closed by tucking in the top panel. Its novel shape adds display value to the individual carton. Note score lines on side walls. The folding of these walls permits shipment of the pre-glued carton in the flat.*



31



32

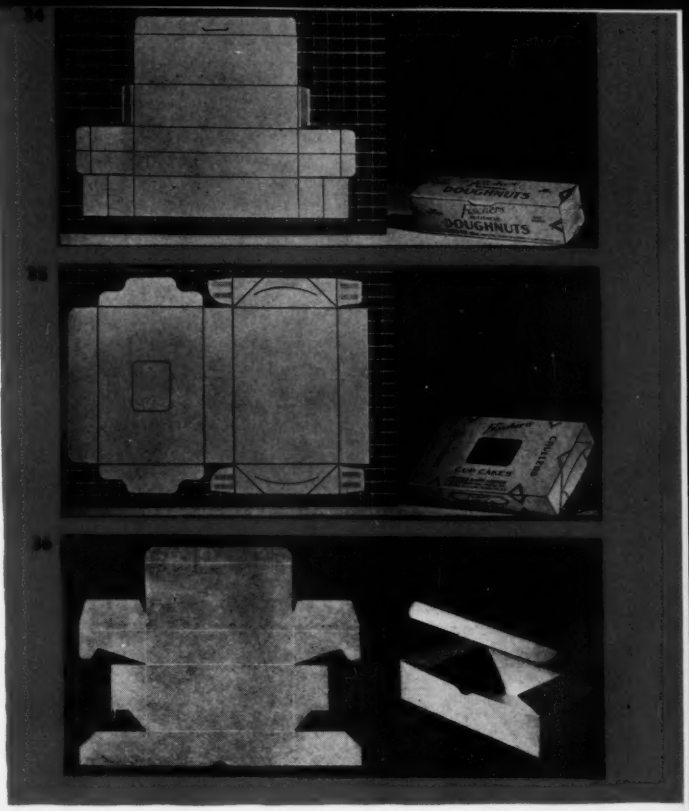


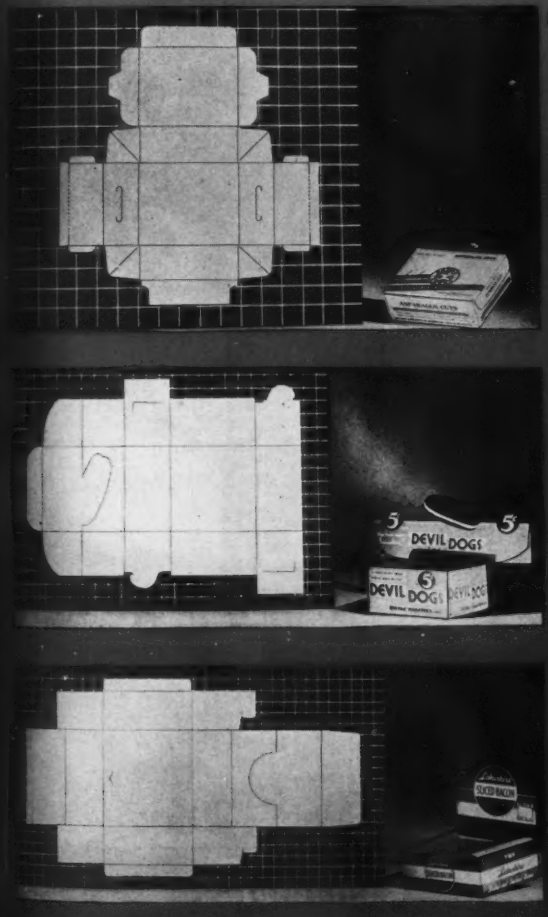
33

34—ONE-PIECE COLLAPSIBLE CARTON. *A simple one-piece container serving as a carrier especially useful for bakery goods, cigarettes and many other products where quick set-up and low cost are factors. Shipped to user in knocked-down form, so that it occupies a minimum of storage space. Note cross hatched indications for glued seams. These tabs adhere to the outer ends of the bottom-most tabs. The intervening wall forming the bottom of the container is scored to fold in half, lengthwise, when shipped. This is snapped into erect position and made rigid by turning up tabs on side walls.*

35—ONE-PIECE COLLAPSIBLE CARTON. *Quickly set-up carton, made with tongues on cover which tuck into slots on the sides, making this style especially well suited for baked goods and similar products. Transparent cellulose window allows view of product without opening carton, which is most important to keep food products fresh and avoid spoilage from exposure to dust, flies or frequent handling before sale. Sometimes used with an inner band or liner, placed around a cake, the carton being made sufficiently high to prevent contact of cover with frosting.*

36—ONE-PIECE PETERS STYLE CARTON. *Used for lard, shortening, cheese, macaroni, crackers. May be used with a liner. Liner may be folded to be held permanently for cracker packaging or to be removable for lard packaging. Carton is adaptable to range of sizes for hand or automatic filling. Simple to convert from hand to machine operation. No gluing required.*

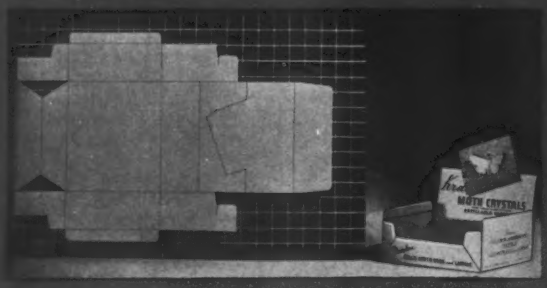


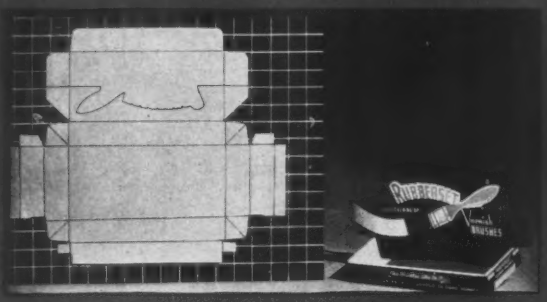


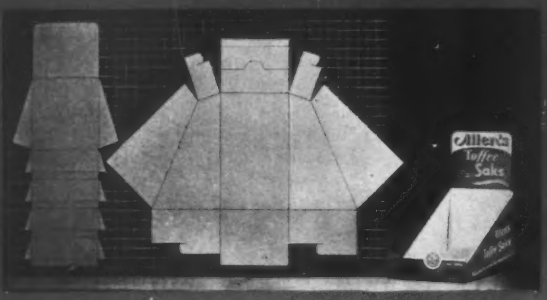
37—ONE-PIECE SIMPLEX STYLE CARTON. *Combines rigidity, finish and strength of set-up box and economy in cost, shipping and storage of a carton. Quickly set up without machinery. Made in all sizes from small candy boxes to large containers for blankets. One-side printing. Made with or without display lids and slip-over covers. No raw cut edges or outside locks mar the outside printed surfaces or finished appearance of the carton.*

38—ONE-PIECE CARTON WITH TWO HOOK CATCHES. *An economical carton for local bakery use, where small quantities of several sizes are required. A catch lock on each end holds the carton upright. This style is not sufficiently durable to stand long distance transportation or rough handling, but is used by bakeries for packaging cakes sold in their own retail stores and carried home by consumers. Also made with transparent window.*

39—ONE-PIECE OVERLAPPING FRONT—LOCK BACK PANEL, FOLD COVER. *Economical to manufacture and extensively used for display purposes, this box has the added strength of the overlapping front which is not provided in the straight front box. The box can be made with panel-fold style display top, making possible printing on one side only.*







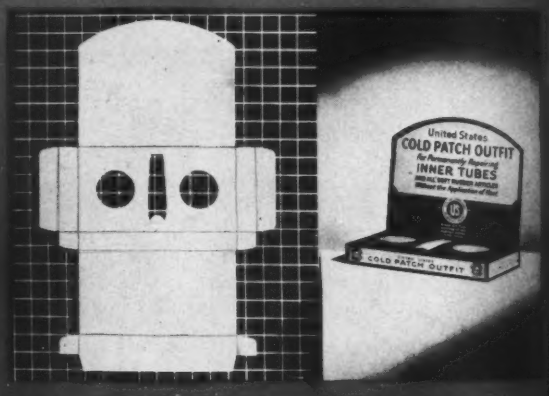
40—ONE-PIECE OVERLAPPING LOW FRONT DISPLAY CONTAINER. *Similar to No. 39, only front is cut down to show face panel of articles when they are packed in an upright position. The tuck flap at the top of the container should be made long enough to provide full protection for the packaged contents at the front corners, where the low wall of the display container offers a relatively weak point.*

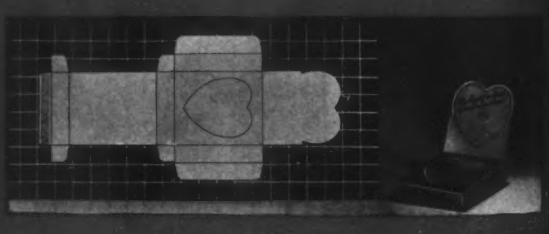
41—ONE-PIECE SIMPLEX CARTON DISPLAY. *An efficient container and display unit. Die-cut cover offers excellent advertising display. Easily set up and free of locks on the exterior surfaces. Its most popular use is for one-dozen units such as paper wrapped toilet soaps, automotive or hardware items. Does not require protective sleeve as cover closes with front and side tucks. The side tucks, furthermore, increase the size of the display panel itself.*

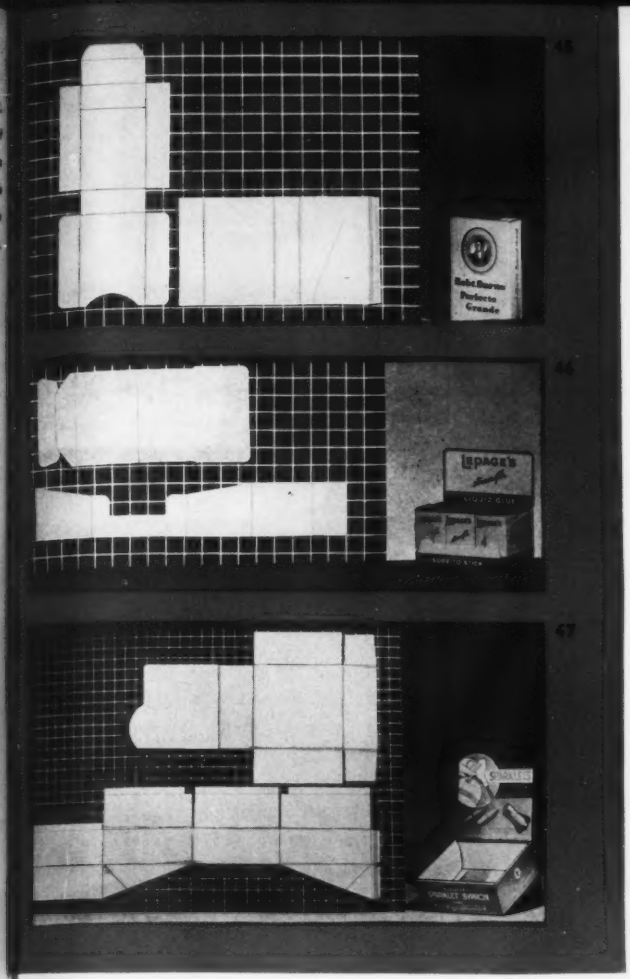
42—RHOMBOID DISPLAY CONTAINER. *An effective new type of display container in which the individual packages are displayed in a staggered manner. Particularly useful for fragile items packed in glassine or transparent cellulose bags. Keeps packages in neat position while on display. This is a patented type of display container construction.*

43—FIVE-PANEL COUNTER DISPLAY CONTAINER. *This style has replaced the old type of five-panel carton which requires printing two sides and coating two sides, primarily used for introduction and sampling of new products. To set up this display, it is only necessary to insert the end tucks. Note that the four lower panels (in diagram) form a carton in themselves, the fifth panel, or tail, forming the display background.*

44—FIVE-PANEL COUNTER DISPLAY. *Same general style as No. 43 except that it has been made to serve as a display shipper and carry-home unit. As a carry-unit the display panel folds down over the die-cut carton face to provide an effective closure. If desired, this panel could be so designed as to incorporate locking tabs for added strength.*







A B: combination

45—TUBE AND SLIDE. *Consists of a folding inner portion, variously contrived, to be inserted in a tube on which the design is printed. Access to the contents is easy and quick. It offers adequate protection for a wide variety of products, such as cigar packs holding five or ten popularly priced cigars. When this style is made with an inner tray it is well suited for pills and capsules which may be carried in the consumer's pocket.*

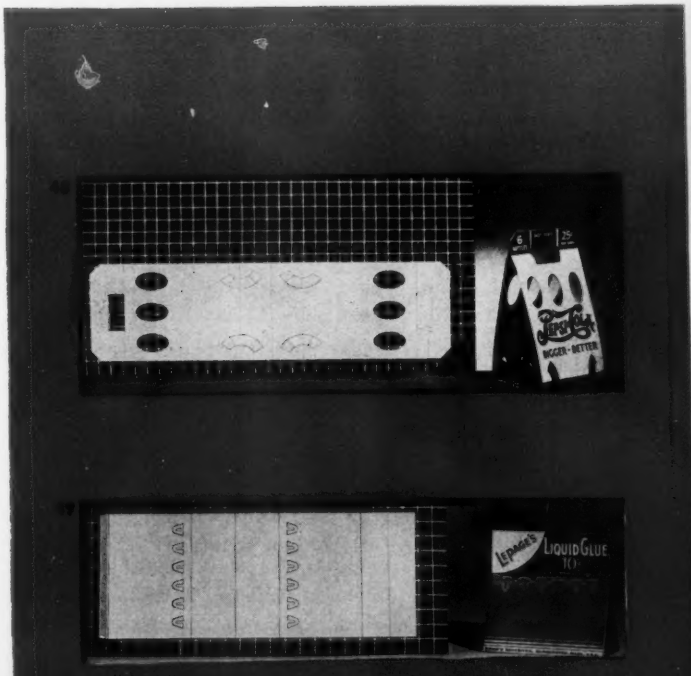
46—BROOKS TWIN DISPLAY CONTAINER. *A patented twin display container, the two sections nesting into each other, giving the dealer two distinctive counter displays. This unit of two containers requires a protective sleeve for shipping. It is economical and easy to set up by the packer and the retailer. Patented.*

47—SIMPLEX DISPLAY CONTAINER. *A special easel permits tilting this container at different angles, for effective display. Requires printing and coating one side only. Protective sleeve necessary for shipping. Principal feature is the simplicity with which the dealer may display the goods at an angle. Display panel is equipped with supporting flap which enables advantageous showing of the advertising message.*

Carriers and dispensers

48—SIX-BOTTLE CARRIER AND DISPLAY. *This carrier has the feature of being an effective display and carry-home carton combined. It requires printing two sides; however, printing is only required on the inside for the display feature. For economy, therefore, the outside printing could be eliminated. Patented.*

49—MULTIPLE-UNIT DISPLAY CARD. *Economical display card holds twelve tubes suspended from die-cut tabs. Six units are on display with a reserve stock of six tubes on the back panel. The design repeats so that display can be reversed when front half of goods is sold. This card requires no separate easel but can be folded to ship flat.*





1—Frozen food packages undergo all the hazards attendant on refrigeration, nevertheless waxed cartons can be given a distinctive decorative treatment that will stand the gaff. Illustration shows printed designs registered by means of an electric eye. Photo, Battle Creek Bread Wrapping Machine Co.

Waxed and paraffined cartons

by Owen E. Lyons

Cartons made of wax-coated or wax-saturated paperboard are of outstanding value in the modern scheme of packaging and shipping products. Certain packaged food products such as ice cream, butter, lard, oleo, shortening, cheese and frozen foods are shipped and stored under full or partial refrigeration. Upon removal from refrigerated temperatures to room temperatures, moisture droplets gather on the surfaces of the carton. Wax treatment provides resistance to this moisture and enables the carton to retain its strength and shape en route to the consumer's kitchen.

Types of paraffin application

There are two principal methods of applying wax: the high-gloss or cold-water method, which leaves a coating of wax on the surfaces of the carton; and the saturation or impregnation method which drives the wax into the fibres of the board, leaving the surfaces comparatively dry and uncoated. A third and less common manner of treatment is "dull paraffin," by means of which a very light coating of non-glossy wax is laid on the surfaces.

Another method, now common for military packaging, is the wax dipping system of protecting the outside.

Some time ago, firms wishing to guard the contents of frozen food packages from dehydration—at the same time doing away with the customary cellophane or paper liner—developed a method of dipping the folded and closed ends of the packages in a special wax bath. Special waxes were used to provide a covering that would be fairly flexible and would not become brittle when it hardened or was subjected to temperature changes.

The large quantities of food and other supplies for the armed forces are now almost universally given the wax-dip treatment. The difference is that these military packages are completely dipped, covering the entire surfaces with a heavy and protective wax coating. Packages so protected will stand up perfectly under widely differing temperatures and humidities.

The basis of manufacturing paraffined cartons is the printing and die-cutting of the carton so that its printed design and all the board used in its construction are available in one unit, properly printed, scored and cut. Production of commercial quantities of cartons is handled in combination runs—same number of cartons per sheet. The combination may include cartons of but one design, or it may be made up of various sizes, colors, designs and construction combined to run efficiently together. Manufacturing procedure follows this sequence: printing, die-cutting and scoring, paraffining and gluing.

Printing and waxing

The merchandising advantages of well-printed designs and colors are available to buyers of paraffined cartons. Paperboard manufacturers provide a well-bleached outer surface that is excellent for modern printing processes. A semi-bleached or unbleached inside surface is usually specified for cartons that carry food not directly in contact with the inner surface—butter and lard, for example. Linerless ice cream cartons are factory-filled, with the ice cream directly in contact with the inner surface. A solid-bleached sulphite board is standard for this carton.

The inside surface of a linerless ice cream carton is treated with a special, high-gloss, hard-surface wax to ensure against weakness of the surface next to the product. The outside surface is treated with a lighter, egg-shell wax coating which affords adequate protection against attack by moisture from the outside. Varying weights of wax, and varying compositions, may be applied to attain specific protective properties.

Considerable progress has also been made in paraffining. In addition to a store of technical knowledge concerning waxes, wax combinations and properties of waxes, the industry has greatly advanced the technique of applying wax.

Gluing of paraffined cartons

The gluing operation follows the printing, die-cutting and waxing of high-gloss waxed cartons. Special gluing



2

2—Efficient packaging as well as butter shortage has been a factor in increasing sales of vegetable shortenings. Photo, The Marathon Corp.



3

3—Waxed cartons help oleomargarine hold its place in the face of unfavorable laws and keen commercial rivalry. Photo, The Marathon Corp.

machines remove the wax from the surfaces to be glued, a glue wheel spots the adhesive at the proper points, and the folding and setting of the glued surfaces is then done by the gluing machine. Glues derived from vegetable sources are standard specifications for employment in food containers.

For extra charge (an extra machine operation), the paraffined cartons used for ice cream can be furnished with a de-waxed strip on which the names of flavors may be stamped.

Construction and sizes

Paraffined cartons for foods, in contrast to unparaffined cartons for miscellaneous uses, are well standardized in construction and in size. This is especially true of packages for ice cream, units of which have been standardized in pints, quarts and multiples thereof. Packaging of ice cream is either a semi-automatic or a manual operation, and this has a bearing on standardization of construction.

Likewise, cartons for butter, lard, oleo, shortening and cheese have a constant unit of sale—the pound or multiples of it—which limits their variation in size.

Frozen food packaging

The newest branch of the food business to support sales of paraffined cartons is the frozen food industry. Because frozen foods require extraordinary protection against dehydration, a number of packages intended to assure that protection have been used—many proved unsatisfactory.

Foods have long been frozen in bulk containers for such wholesale users as hotels and bakeries. More recently a far wider demand has developed for the retail consumer units, distributed by means of refrigerated display cases. Latest development in this field is home freezing, for which freezing units and packages are available in sizes and quantities to permit the housewife to preserve the fruits of her victory garden, using her curling iron or flat-iron to seal the package[1].

Regardless of size of package or scale of operations—bulk packages, commercial consumer units, or home-freeze, all branches of this activity have one major problem in common—that of protection against the loss of moisturevapor which causes freezer burn and desiccation.

The sub-zero and near-zero temperatures in which

[1] See **Modern Packaging** (Vol. XVII, No. 4), December 1943, "Frozen Victory Gardens."

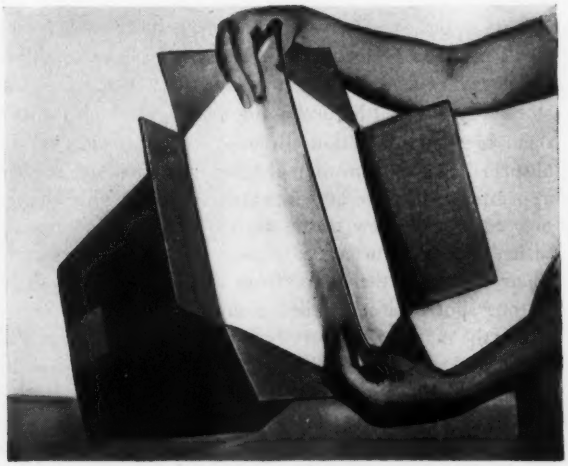
4—The waxed carton has a long service record in packaging butter, perhaps the most odor-absorbent of foods. Photo, The Marathon Corp.

4



5—Wax coating of bulk containers has received an impetus due to war demands. Bag is parchment, heat-sealed. Photo, The Marathon Corp.

5





6

6—A waxed carton for home-frozen foods. The cellophane inner bag may be heat-sealed by use of a curling iron. Photo, Interstate Folding Box Co.

foods are frozen and stored are extremely dry. Seeking to absorb moisture from every source, the dry air "blots up" moisture and exerts a constant "pull" on any object having moisture content. The air takes up moisture in the form of moisturevapor, an invisible gas which readily penetrates ordinary papers and packages.

A striking demonstration of this air attack can be arranged by placing an uncovered cake of ice in a locker storage room. Little by little the ice will disappear. It will not "melt"; it will not leave the pool of water you would expect to see when ice melts in high temperatures. The cake of ice will grow smaller and smaller and eventually it will disappear without a trace. Its moisturevapor will then have been entirely absorbed by the dry air.

This is the exact physical action against which frozen foods must be protected. This is the damaging condition which makes it absolutely necessary that frozen foods in storage be covered by packaging materials which insulate them against this action. Because their moisture is air-absorbed in the form of moisturevapor, foods change in appearance, in taste and in nutritive value. This change may run from a few white, dry surface spots, commonly called "freezer burns," to almost complete desiccation. Their taste will then vary from an occasional tough or fibrous spot to a straw-like, completely flavorless lump.

For the most satisfactory freezing, the complete content of the package should be frozen as thoroughly as possible. Because of an odd shape, certain packages do not permit penetration of the freezing temperature to the entire content. Thus a center section of certain packages may be only partially frozen. Experience proves that a package which allows more inch area exposed to the cold temperatures freezes faster and holds the freeze better than a package with less exposed area.

Not all packaging materials can withstand the damaging attack of the cold and extremely low humidity. Certain wrapping materials may develop a tendency to dry out, to become brittle and to break when exposed to these conditions. Certain coatings applied to papers as a layer of moistureproofness or for heat-sealing purposes may crystallize and break after exposure to storage temperatures and humidity. This breaks the continuous moisturevapor protection afforded the contents of the package and every break provides an opening for a loss of moisture.

A point which hasn't been stressed much in previous discussions of frozen food packaging is the range of temperatures which certain products must have. Some vegetables, for example, are pre-cooked or blanched before freezing. From a temperature above boiling point, they are placed in a package at room temperature. Then they are exposed to a sub-zero temperature for quick freezing and finally they are stored for an indefinite period at a locker freezer or home freezer temperature. Such extremes of heat and cold, such wide variation in temperature and humidity make certain foods even more sensitive to damage and make more emphatic the need for absolute packaging protection.

The ideal package, for any one of these divisions of frozen foods packaging, will combine all the desired protective features, sturdy construction and the more practical advantages of easy setup, filling and closure, but the first and most important packaging rule is: "Protect against moisturevapor loss!"

7—Paraffin-treated cartons, available in various consumer unit sizes are used in packaging of quick-frozen products. Photo, Sutherland Paper Co.

7



"Bag in box" packages

by Alan D. Crowley

Probably no other package development received more impetus from the war pressure than the "bag in box" package. Principal sources of tin were lost, other packaging materials were limited in necessary characteristics or scarce because of increasing demand. At that moment the "bag in box" was seized as one of the most promising packages to help bear the load of war and essential civilian packaging. Perhaps the most significant feature of the "bag in box" was the possibility it presented of combining the properties of two or more packaging materials to do a packaging job. It was virtually wrapping a product in a "tailored-to-measure" package that would have the *exact* qualities (no more and no less) to package a given product adequately.

A brief review of the "bag in box" development shows that it had gained steadily in acceptance from its early use by the cereal people to protect packaged contents. Modified versions of this package were found in the packaging of crackers, raisins, shredded cocoanut and many other products requiring protection from sifting, insect infestation and moisture. More attention was called to this development in 1929 when the frozen food people introduced it as the answer to a moisture-vaporproof wrap to protect their products during the freezing chain and in transit to the consumer. From that period on, "bag in box" uses became more common but it remained for the war to bring this type of packaging into the full stage of its development. No longer was its offer of protection against loss of moisture-vapor sufficient—it faced the problem of offering protection against water, gas, oil, dust, dirt, variations in atmospheric conditions and insect infestation.

Today the "bag in box" has gained such wide usage that its range includes the packaging of extremely dry products—where sifting is a factor—to those containing moisture and even animal, mineral and vegetable oils and fats. Package sizes vary from the packaging of 1 oz. of a product to those where as much as 100 lb. are packaged. The materials used in the box include all grades of boxboard from plain chipboard to the toughest kraft stocks and with all standard finishes. The bags are made in practically all grades of bag material from the most transparent to the most opaque and with a wide range of protective properties.

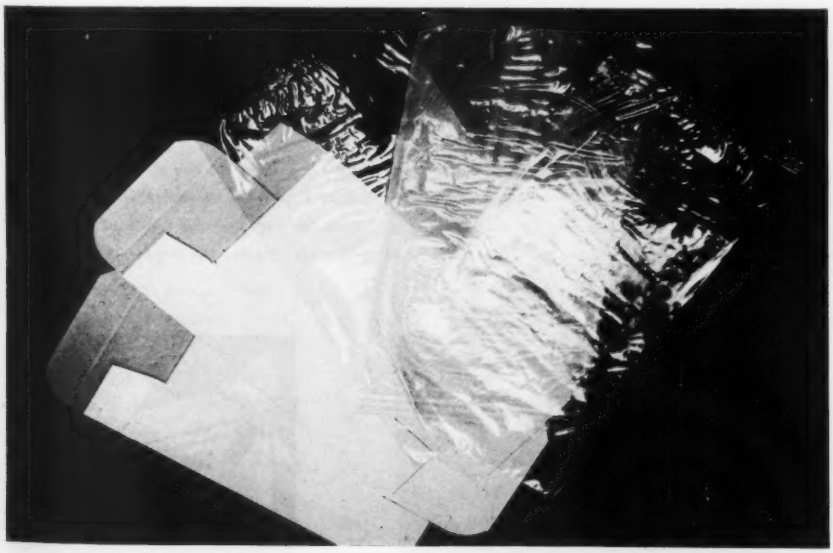
The bag

The materials from which these bags are made include cellophane, glassine, pliofilm, foil, vegetable parchment, sulphite, bond and kraft paper and various other specialized stocks. The two styles of bags most generally made from these materials are the flat type and square or gusset construction. Both have middle seams and seal ends and differ only in that the gusset type squares out when in use to permit full expansion within the box.

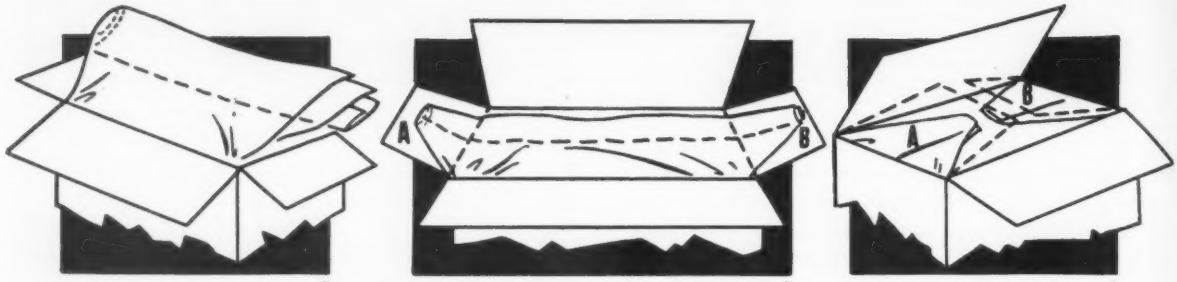
The protective qualities of the bag are enhanced by the use of thermoplastic, wax, lacquer and resin coatings. A heat seal gives products a relatively high degree of protection against moisture-vapor transmission, sifting, animal, mineral and vegetable oils, gases, light and shock resistance. One bag material may be laminated to another to secure maximum protection in a single bag. The laminating adhesives (amorphous wax and asphalt) themselves contain properties which contribute to the end result of product preservation.

The box

The box performs two important functions (1) it protects the bag and (2) it offers a display surface for brand identification and sales design. While untreated paper-



1—"Bag in box" packages do a good protective job for a range of products from the dry and siftable to fats and other moist and oily substances. The bag may be made of various materials high in protective function; the box protects the bag and offers a display surface. When the box is cut out, it becomes a visibility package. Photo, The Gardner Richardson Co.



2 3 4

Forming a closure for a "bag in box" package with a standard confectioner's fold: 2—After the lips of the bag are drawn together, edges should be rolled over several times until they are level with the top of the box. 3—The bag is now ready for closing. End flaps and "ears" at A and B should be folded toward the center of the box as illustrated in Fig. 4. 4—The end flaps and "ears" are here shown in their final closed position. The remaining two flaps should then be closed and the box should be sealed. Result is a secure, tight closure. Photos, The Gardner Richardson Company.

board obviously cannot offer the degree of protective properties found in the bag, it can offer a relatively high degree of moisture-, water- and greaseproofness and a flexible degree of printing, rigidity, toughness and folding qualities dependent upon the requirements necessary to the adequate packaging of the product.

To give an indication of the range of boxboard toughness a 0.035 plain chipboard has a bursting strength of 80 lb., while a 0.035 solid kraft requires 275 lb. of pressure to cause a break in the boxcard. The most widely used box materials are clay-coated, coated white boxboard, white surface board, solid kraft or board made from reworked pulp with a kraft content, bleached manila, asphalt-lined board, chemically treated board to provide special properties, and corrugated board. Styles number in the hundreds including most standard styles and display, window, dispenser and special reclosure boxes all adaptable to "bag-in-box" packaging.

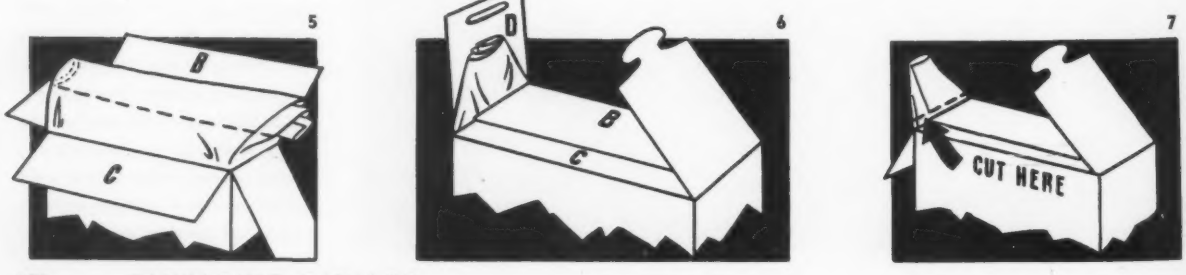
There are three types of "bag in box" construction. The first is the "floating" type where the bag is inserted loose in the box by means of a mandrel. This type is set up and assembled at the scene of the packaging operation. The second is an application where the bag is spot glued into the box during manufacture and shipped to the packager folded as a complete unit. The third method finds the bag firmly glued to the inner walls of the carton overlapping at both ends enough so that a seal may be formed. This procedure likewise presents a complete "bag in box" unit to the packager.

If the full value of the "bag in box" package is to be obtained, the closure is of the greatest importance. In cases where the nature of the product makes sifting a likelihood, or where liquid tightness of high moisture-vaporproofness is necessary, heat sealing is preferable. (See *Heat-sealing Equipment*, p. 662).

When the inner bag is sealed, the top should be folded back two or three times in the manner commonly called "confectioner's fold." Then the "ears" are turned in, and the result is a very tight closure, especially if the filled bag fits so snugly into the box that pressure is exerted on the bag by the top folds of the box. To provide a pouring spout for the contents, one of the "ears" is left extended in such a manner that it is closed when the end flap of the box is locked or glued shut. When the box is opened, this protruding "ear" is cut to form a convenient opening. The accompanying diagrams show the steps in these two operations.

Perhaps the outstanding advantage of the "bag in box" package is its adaptability. It is "tailored" to fit a given product and presents an economical, salable, consumer package. It is adaptable to both small and large packaging operations yet it retains all the advantages of folding carton packaging in that it is economical in shipping, storage and handling. Product visibility may be achieved through the use of a cutout in the boxboard, the transparent bag presenting the visual medium. If the product does not have the necessary consumer appeal a fine boxboard surface may be provided, on which a well-considered design having the necessary sales appeal and display value may be reproduced.

To make a pouring spout closure: 5—If it is necessary to prevent sifting or if high moisture-vaporproofness is desired, the bag should be heat sealed, if not, the standard confectioner's fold may be used. Only one "ear" should be turned in before flaps B and C. 6—Extending flap is folded toward center of box along with slotted flap, D. Tongued flap is folded over and locked in place. 7—In opening, user can turn back end flap and cut off extending "ear". Free-flowing products may be poured as needed, carton may be reclosed for future use. Photos, The Gardner Richardson Co.



5 6 7

Set-up boxes

by E. T. Tedeschi

A set-up paper box is perhaps best described as a rigid, non-collapsible container, produced in three dimensional form delivered to the consumer ready for use. Basically it consists of one or more "blanks" of non-bending boxboard, fully wrapped with paper. For the prospective user, it is important to examine this brief description and all that it implies. Primarily it means that the set-up box arrives in the users' hands ready to receive the article for which it was produced without doing more than lifting the lid. Articles packed in set-up boxes are ready for shipment or warehousing due to the protection provided by the rigidity of this type of package.

Set-up boxes possess many unique features which have combined to make it one of the most widely used types of containers. It is not exaggeration to state that the set-up box lends itself to more interesting variations in construction and styling than any other type. In its simplest form it is a square-cornered two-piece box consisting of base and lid covered with economically produced paper manufactured for that purpose. At the other extreme, the set-up box covered with expensive fabrics or leather and lined with rayons or velvet becomes a rich setting for the most expensive silverware, cosmetics, or jewelry. The variations in shape are as limitless as three-dimensional construction will allow. It is this versatility which makes the set-up box the ideal packaging medium for an endless variety of products.

Luckily, the paper manufacturers have long since realized the possibilities in the use of set-up boxes and responded by developing covering papers in an infinite variety of colors, decorative effects, and finishes. Papers are available today which closely resemble leather, metal, fabrics, and enamel finish, allowing the package designer free play for his creative ability. Produced economically in rolls, from which the wraps are cut, these papers offer splendid possibilities for diversification of color and decoration without the necessity of purchasing extremely large quantities to absorb the cost of art work, engravings, etc. When a fixed design is required, wraps may be printed, embossed, hot-stamped, die-stamped, engraved, lithographed, photo-offset.

Individual design and manufacture can be accomplished at comparatively small cost. There are no expensive originals, tools, or jigs to invest in, and change-overs in size and style can be made in short time.

Today's user of packages for articles sold at retail expects more than a simple protector which will ensure delivery of his product in safe condition. In addition, his package must have the appearance of permanence and beauty which will ensure it a prominent place in showcases, window displays and on the counter at the point-of-sale. Sales appeal may be achieved through the use of striking color effect, styling, printed matter on the wrapping paper, or in combination with transparent film. This latter material permits the combination of all the essential features of set-up boxes with individual "showcase" results. Lightweight transparent film is used for windows in various types of display boxes for articles such as face powder, thermometers, nipples, etc. Rigid sheets are used in conjunction with paperboard to form transparent lids or completely transparent boxes.

For the manufacturer whose need is a safe carrier for fragile items, a retail dispenser for a number of the same items, a semi-permanent cabinet for medical supplies or small machine parts, a simple mailer, or a shipper for highly sensitive explosives, the answer can be found in the set-up box field. A glossary of set-up box terms plus diagrams of the basic construction of such boxes and a full pictorial review of the principal types, will be found on the following pages.



1—Set-up boxes, delivered "ready-to-use," serve many purposes. With waxed paper inner liners, they carry ball bearings. They protect soldiers' medals from tropical molds. They hold precision instruments, machine parts, small tools. They serve as re-use containers which enhance the sales appeal of numerous products.

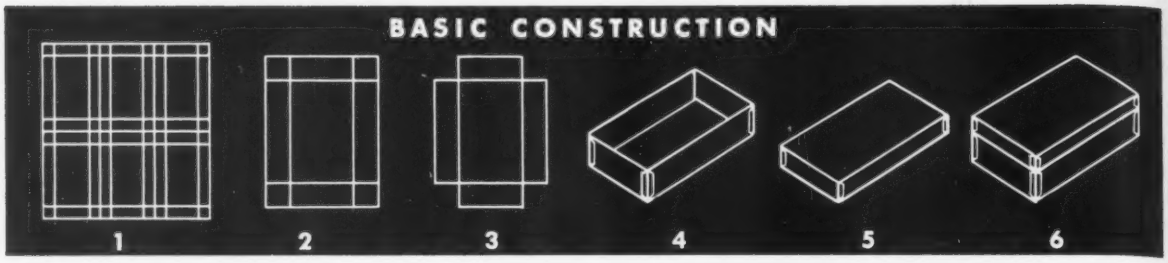
Glossary of set-up box terms

NAME OF MATERIAL MACHINE OR CONSTRUCTION	DEFINITION	NAME OF PROCESS OR OPERATION
ADHESIVE	Any viscous substance used to attach one material to another. Those commonly used in the manufacture of paper boxes are animal glue, vegetable glue (hot or cold), gums, dextrins, and paste	
BALING PRESS	Machine for baling scrap	Baling
BAND	Strip of covering paper around sides and ends of box, without turn-in	Banding
BASE	Lower unit or receptacle of a paper box	
BENDING MACHINE	Machine used for bending sides of base, lid, or tray	Bending
BLANK	Any die-cut, scored and corner-cut, or otherwise partially prepared section of boxboard, in the flat, to be formed into a box or part thereof, e.g., base, lid, or tray	
BOTTOM	Under surface of the base	Bottomsetting
BOTTOM LABEL BOTTOM PAPER	Paper attached to bottom or under surface of base	Bottom papering
BOX	A complete paper box, including base and lid; also used for *base* alone (see above)	
BOXBOARD	Board used in the manufacture of paper boxes*	
COMPARTMENTS	Sub-divisions in a box formed by partitions	
	Placing lids on bases	Closing or lidding
CONTAINER	Large paper box used to hold definite number of smaller boxes	
CORNER	The line formed by junction of sides and ends of base, lid, tray	
CORNER-CUTTING MACHINE	For *Board:* Machine for removing corners from scored blanks and for cutting triangular piece from "ended" box blank, so that side and bottom flanges will bend without interference. Available in single, double, quadruple models For *Paper:* Machine for cutting corners from paper blanks used in loose and tight wrapping operations	Corner-cutting, Mitering
COVER	Upper or closing unit of a paper box	
COVERING MACHINE	Machine used in covering, trimming, or bending boxes or parts thereof with *paper from roll.* Available in hand-operated and power-driven automatic models	Covering
CUTTER	Machine for cutting boxboard, paper, and other materials into sheets or strips of smaller dimensions	Cutting
CUTTING AND CREASING PRESS	Machine for cutting and creasing and die-cutting or scoring blanks in boxboard	Cutting and creasing Die-cutting
CUTTING RULE	Steel strips, ground to center or side face used for cutting through stock	
CUT-SCORING RULE	Steel strips, ground to center or side face, used for partially cutting through stock, i.e., scoring form for purpose of forming a bending line	
CREASING RULE	Steel strips with oval face, used to form a crease or bend a line in stock	
DIE-STAMPING PRESS	Machine used in reproducing design or lettering from engraved plates	Die stamping
DIVIDERS	Loose strips of paper or boxboard used to separate commodities placed side by side	
DOMING MACHINE	Upright press for embossing or doming by applying heat and pressure	
DROP-END	A box in which the end of the base is made in two parts, one hinged to the other, or in which end is hinged to bottom	
DROP-SIDE	A box with the side arranged as described above	
DRUM	Shell or tube with paper head, for powder box	
DUTCH TOP	Lid with padded top slightly smaller than lid in length and width; set-up with shell	
EASELS	Supports attached to box to hold it upright for display purposes	
EDGE	Line formed by junction of sides and ends to top or bottom of lid, base, or tray	Trimming or edging Trimming upper and lower edge of lid, base or tray
ENDING MACHINE	Machine for attaching ends to base or lid. Available in single or double model	Ending or end setting
ENDS	Pieces of boxboard attached to side and bottom flanges of ended box	Ending or end-setting
EXTENSION EDGE MACHINE	Machine for attaching piece of boxboard to top of lid or bottom of base, the piece of boxboard being greater in length and width than the lid or base	Extension edging
FLANGE	That part of a blank that is glued for attaching ends, or sides, or for joining the ends of shell blank. Also the walls of any corner box blank	
FLAP LID	Lid without sides or ends, hinged to base	
FLIES	Strips of plain, printed, or lace paper attached to inner edge of base to cover goods or for decorative purposes	Flying
FLYING MACHINE	Machine for cutting, gumming, and attaching flies	
INVERTED TRAYS	Trays, stayed, or unstayed, placed inside base, inverted	
FILLERS	Loose strips of boxboard, plain or scored, used to fill spaces not occupied by commodities	
FRAMES	Die-cut or mitered forms of boxboard so shaped as to form a display frame for the goods	
FRENCH LID	Lid with extension edge which has sides and ends less in depth than sides and ends of base, and which fits over outside of base	
GLUER	Machine for applying adhesive to surface of paper or boxboard	
HAND SHEARS	Hand-operated knife for cutting sheets of paper, cloth, lace, etc.	
	Any process in the manufacture of a paper box performed without the aid of a machine	Hand work or table work
HINGE	Strip of cloth or paper used to hold parts of box together	Hinging

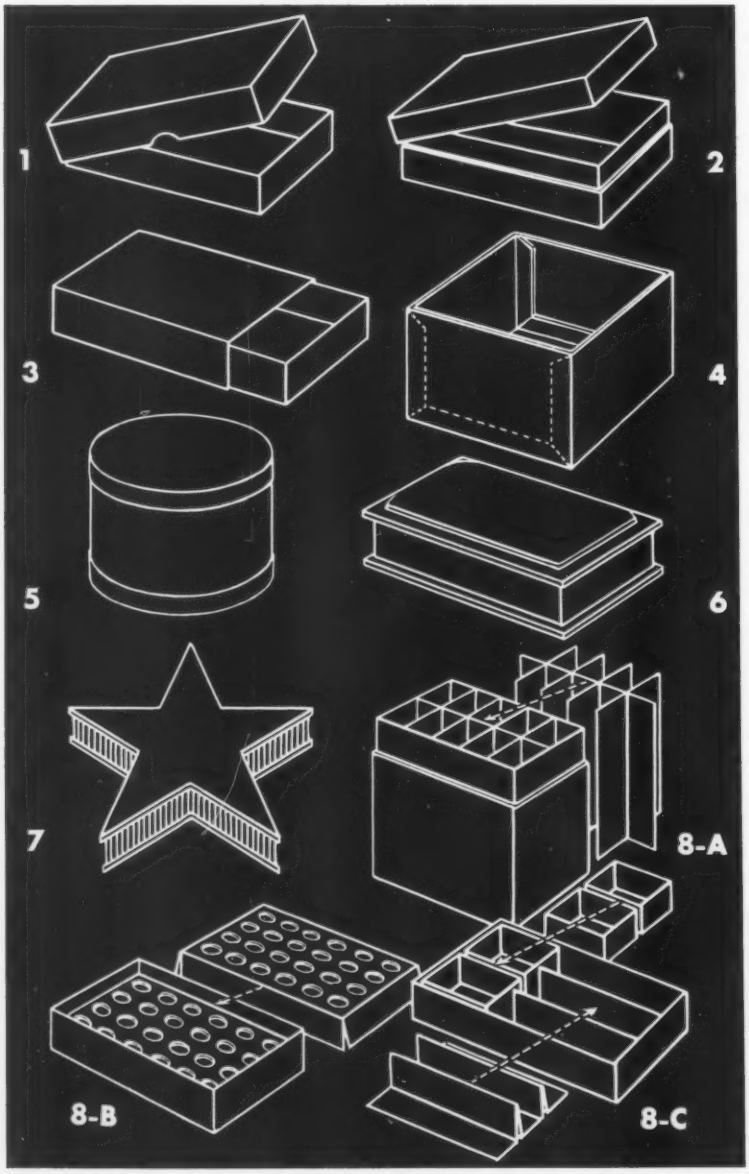
* For descriptions of grades, see "Boxboard—Types and Selection," p. 130.

NAME OF MATERIAL MACHINE OR CONSTRUCTION	DEFINITION	NAME OF PROCESS OR OPERATION
LABEL	A plain or printed piece of paper attached to box or any part thereof; distinct from top or bottom paper	Labeling
LACE	Paper decoration stamped or embossed to imitate lace or embroidery	
LAP	Portion of cover paper that overlaps where ends of paper are joined on base, lid, tray, shell	
LAYERS	Loose pieces of boxboard used to separate horizontal layers of contents	
LID	The upper or covering unit of a paper box	
LID SUPPORT	Tape or ribbon to hold hinged lid in position when box is open	
LIFTS	Pieces of ribbon, cloth, tape or paper attached to trays for convenience in removing from base	
LINING	Material used to finish or decorate interior of base or lid	
LINING MACHINE	Machine for attaching paper from the roll to surface of boxboard	Lining
LOOSE WRAP	Lid covered with paper, wrap folded and shaped on ends of box, either by machine or by hand; wrappers in one piece with adhesive only at edges	Loose wrapping
MACHINE FORMS	Forms of boxboard, wood, or metal used in conjunction with certain machines, e.g., covering machine forms, wrapping machine forms, quadruple staying machine forms, etc.	
MICROMETER	Instrument for measuring thickness of materials in thousandths of an inch	
NECK	A shell inserted in base, attached by adhesive, and extending above the base into the lid when box is closed (see *Shoulder*)	Necking or shouldering
NEST	Collection of boxes of various sizes, one within another†	
	Bundling and wrapping boxes in kraft paper for delivery	Package wrapping
PACKER	Same as *Container*	
PAD	Card or layer covered with paper or cloth and having one or more layers of wadding or other padding	Padding
PADDED TOP	Extra top, covered with paper or cloth and having one or more layers of wadding or other padding attached to top of lid	Padding
PAPERS	The following is a list of papers commonly used in the manufacture of set-up paper boxes: News, Book, Label, Manila, Kraft, Friction Glazed, Flint Glazed, Brush Finish, Embossed, Printed, Florals, and Fancy	
PARTITIONS (loose)	Slotted pieces of boxboard fitted together to form a series of compartments, and placed in base without being attached to it	Slotting
PARTITIONS (solid)	Any construction of boxboard or other material attached to interior of base to sub-divide it	
PATCH	Piece of paper or cloth over lifts, pulls, support for lid, or hardware inside box	
	Process of removing portion of thickness of board from shell or blank flanges	Peeling
PULLS	Metal handles or pieces of tape or ribbon attached to base of shelf or file boxes for convenience in removing from shelves	
REINFORCING	Strip of paper or string under cover paper	
ROTARY BOARD-SLITTING MACHINE	Machine for slitting sheets of board into sheets of lesser width	
ROUND AND OVAL CUTTING MACHINE	Hand-operated machine for cutting round and oval tops and bottoms	
SCORING MACHINE	Machine for scoring and cutting boxboard	Scoring
SHALLOW LID BOX	A box having a lid of less depth than the base	
SHELL	A glued blank, any shape but round tube, open at both ends	
SHELLS (loose)	Shells used to support layers	
SHOULDER BOX	Box with a glued neck so inserted that ends and sides of base form a shoulder upon which lid rests	
SHOULDER BOX GLUING MACHINE	Machine used to glue in necks	
SLIDE BOX	Box with lid in shell form, into which base is inserted	
SLITTING MACHINE	Machine for slitting rolls of paper into rolls of lesser width	Cutting or slitting
SLOTTING MACHINE	Machine for cutting slots in boxboard for forming partitions	Slotting
SLOTTING SAW	Saw for cutting slots in boxboard for forming partitions	Slotting
STAY	Material used for reinforcing corners of base, lid, or tray; may be of paper, cloth, combination (cloth and paper), wire, or metal.	
STAYING MACHINE	Machine for reenforcing corners of paper boxes or parts thereof. Available in single and quadruple models	Staying
STENCIL MACHINE	Machine for applying adhesive to edges of paper to be used on wrapping machine	Stenciling
STEPS	Shells or trays of varying sizes attached inside base to raise one row or portion of contents higher than the row next in front; or attached inside lid to hold articles of various heights in place	
STOPS	Pieces of boxboard attached inside of ends of lid to hold base in proper position when height of base is less than height of lid	
TAPE	Woven or braided cotton material	Taping
TELESCOPE BOX	A box with base and lid of the same depth	
THUMB-HOLE	A semi-circular or triangular cut made in sides or ends to facilitate removal of lid from base, or contents from base	Thumb-holing
THUMB-HOLING MACHINE	Machine for cutting thumb-holes	Thumb-holing
TIGHT WRAP	Lid, base, or tray covered with paper, wrappers being in one piece and having entire surface covered with adhesive	Tight wrapping
TOP	Outer surface of the lid	
TOPPING MACHINE	Machine for attaching top or bottom paper	Topping
TOP-PAPER	Paper attached to top of lid	
TRAY	A receptacle with no lid	

† According to present ruling for Freight Classification:
Unless otherwise provided, ... nesting means that three or more different sizes of the article for which the "nested" specification is provided must be enclosed each smaller within each next larger, or that three or more of the article for which the "nested" specification is provided must be placed one within the other so that each upper article will not project above the next lower article more than one-third (1/3) of its height.



Six steps in the basic construction of set-up boxes: (1) A sheet of boxboard is first scored to the size specified; (2) The scored sheet is then broken into individual box blanks; (3) Blanks are corner cut; (4) Next, cut blanks are turned down and corner stayed; (5) The lid is processed similarly; (6) Together the lid and the box form the simplest type of set-up paperbox which is known as a "skeleton" box or a "rough carton" with shallow lid.



Many variations and combinations may be developed from the basic set-up box, and many types of paper covering and decoration may be applied to them. Some examples of these are given in this diagram. Additional unusual types, obtainable by handwork, may be found in the 1938 and 1939 editions of the **PACKAGING CATALOG**.

1—Full telescope box.

2—Neck or shoulder style.

3—Slide style.

4—Ended box.

5—Round box.

6—Extension edge with pad top.

7—Star shape.

8—Examples of interior partitioning used for additional protection of the contents of the box.

8-A—Slotted partition.

8-B—Died-out platform.

8-C—Longitudinal and tray dividers.



Industrial uses

The set-up paper covered box is in wide use for both industrial and luxury products. The illustrations on this and the following pages demonstrate both of these possibilities as well as the wide variety of shapes, forms and constructions which this versatile type of package permits.

1—Telescope box for brake linings; end panel provides space for identity, size specifications, etc. Photo, Simplex Paper Box Corp.

2—Hinged lid box with interior partitioning to protect small vials and provide for easy removal. Die-cut block holds necks of vials firmly in position. Photo, Dennison Manufacturing Co.

3—Hinged lid shoulder type box for vitamin pack with interior paper lining, cellulose tray and protective flap. Photo, W. C. Ritchie & Co.

4—Shallow lid type box for toiletries with separate interior box to hold shaving soap container; latter has die-cut top permitting display of contents. Photo, Simplex Paper Box Corp.

5—Shallow telescope box designed for protection and easy packing of surgical instruments; fitted with flannel covered platform which holds instrument firmly in place. Photo, Walter P. Miller Co., Inc.

6—(Left) Cosmetic box adapted to military function—camouflage kit in hinged type lid box with mailing box fastener. (Right) Telescope box thumb-cut for easy opening, used for military parts; designed in accordance with Joint Army-Navy Specifications. Photo, Mason Box Co.



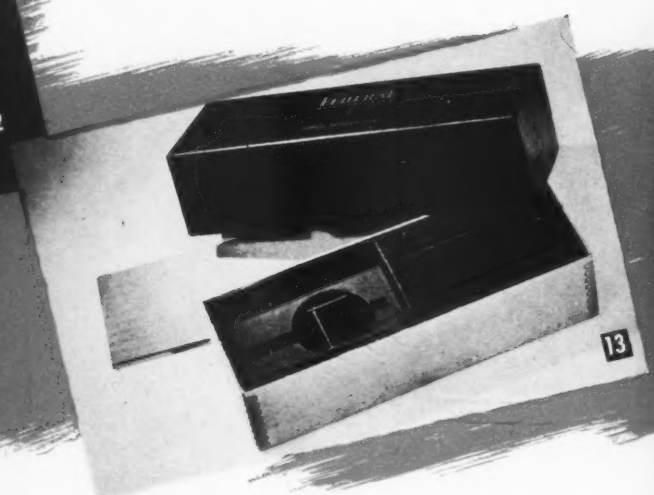












7—(Upper) Slide type box for protection of delicate tipped tool. (Lower) Telescope box with die-cut partitions braced by interior divisions and protected by cotton pad in lid. Designed for protection and easy selection of small drills. Photo, Cambridge Paper Box Co.

8—The familiar druggists' prescription box for pills, pellets and capsules is a round banded set-up box. Photo, F. N. Burt Co., Inc.

9—Partitioned boxes of paperboard treated to resist grease for packing small tools. Note gummed flaps for sealing the package. Photo, W. C. Ritchie & Co.

10—A sturdy set-up box of telescope construction takes the place of the familiar metal container. Photo, Dennison Manufacturing Co.

11—Deep box, telescope type, for samples of building material. All external panels used to convey sales messages. Cellophane window permits exhibit of contents.

12—*Telescope type box of extra heavy construction for protection of replacement machine parts; extended gummed flaps prevent pilferage. Photo, Warner Bros. Co.*

13—*Fitted box for precision instrument, equipped with slotted partitions, trays and die-cut platform. Base has metal reinforced corners, lid has corrugated pads for shock protection. Photo, Mason Box Co.*

14—*Group of utility boxes: (Upper left) Container for germicidal soap. (Upper right) Slide type box with interior wood block tray to prevent flexing of contents. (Lower left) Deep box of slide type for proprietary remedy. (Lower right) Hinged box for medicated foot pads; hinge, of metalized paper, covers top and bottom of box—identity features on top and directions for use on bottom. Photo, W. C. Ritchie & Co.*

15—*Window box with interior partitioning for clinical thermometer. Photo, Dennison Manufacturing Co.*

16—*Shoulder type box with tray for packing fruit cake, fitted with interior blocks for positioning contents. Lid is died out to permit visibility of contents. Photo, Old Dominion Box Co.*

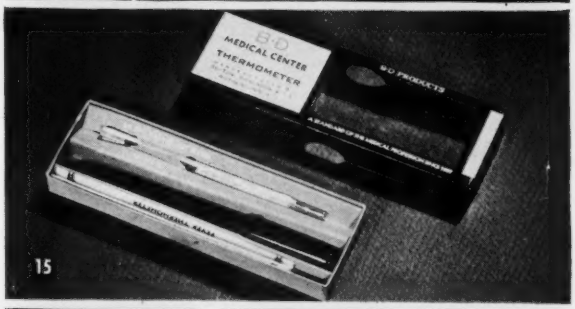
17—*Deep telescope type box for normal human blood plasma; has compartments for two vials and end pockets for administering equipment; corrugated liners for added protection of contents. Photo, Walter P. Miller Co., Inc.*

18—*Shoulder type kit box with hinged lid and tape tie; interior dividers provide for assortment of finger cots and aprons. Photo, Simplex Paper Box Corp.*

19—*Stationery box with hinged lid, drop front, and tray, fitted with compartments for paper and envelopes. Photo, Walter P. Miller Co., Inc.*



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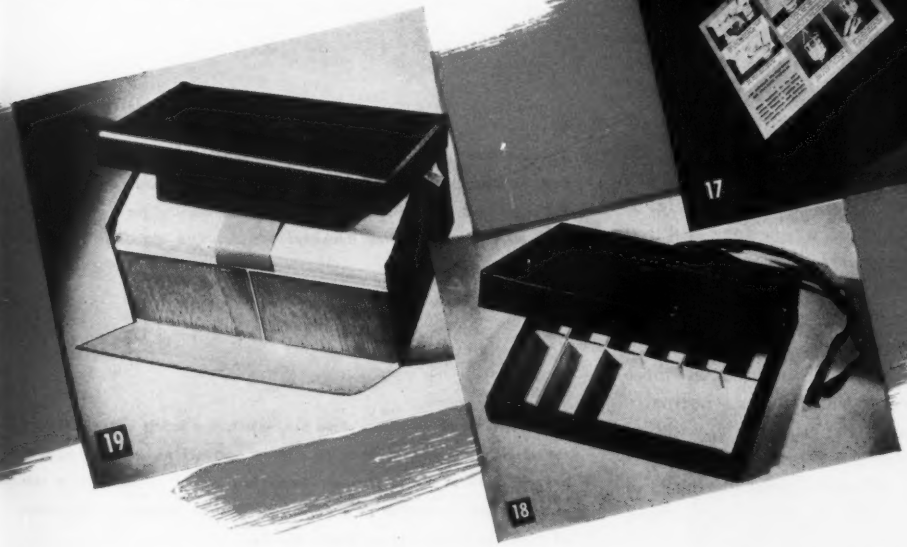


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Decorative uses



Perhaps because of its beauty and eye appeal, the set-up box is usually associated with the packaging of confections, cosmetics, lingerie and other luxury products. It is true that this type of package comes to its finest flower in these fields; and it is with understandable pride that the industry presents examples of its craftsmanship. But it should not be forgotten that war activities have enormously expanded the usefulness of this package. As can be seen from a glance at the pages which immediately precede this one, set-up boxes are being used for many new purposes.

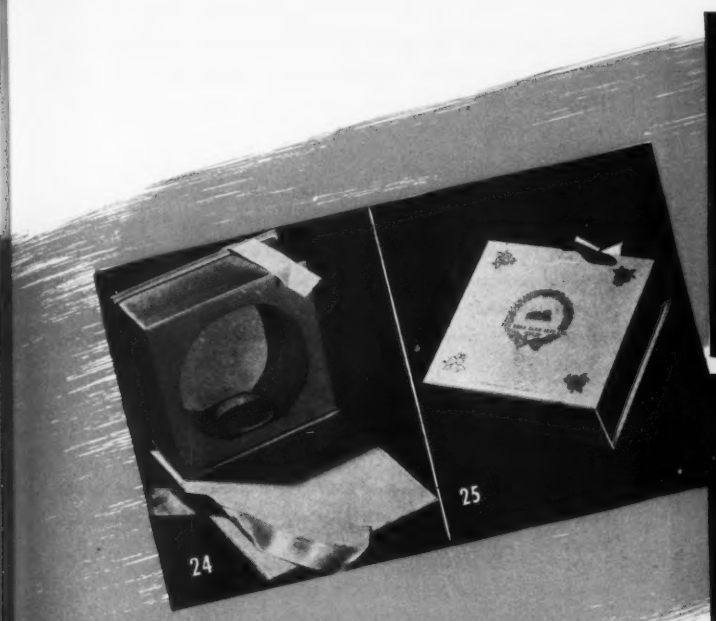
This does not necessarily mean that the set-up box has displaced or will displace other forms of packaging. It simply means that more packaging is being done and that more products—and more consumers—have benefited because of a new realization of the advantages of packaging.

No one can properly appraise the value of the set-up box as a package without considering both types—utilitarian and decorative—which are illustrated in these pages. For the present, many of the materials normally available are severely restricted for use in any kind of decorative packaging. But with the return of peace will come a return to the aesthetic element in packaging, and the set-up box will again prove its value as a thing of beauty.

20—Large sized half round box with hinged lid and ribbon stop. Sturdy construction affords excellent protection for the contents, which make up a cosmetic set. Box is shoulder type construction with an interior platform which is rayon-satin covered in color to set off contents. Photo, W. C. Ritchie & Co.

21—Shoulder type box with hinged lid, domed and padded top which is inset into recessed tray; fitted with satin covered supporting platform. Lid is padded inside. Color and design show dignity and restraint, but trademark affords quick identity. Photo, Old Dominion Box Co.

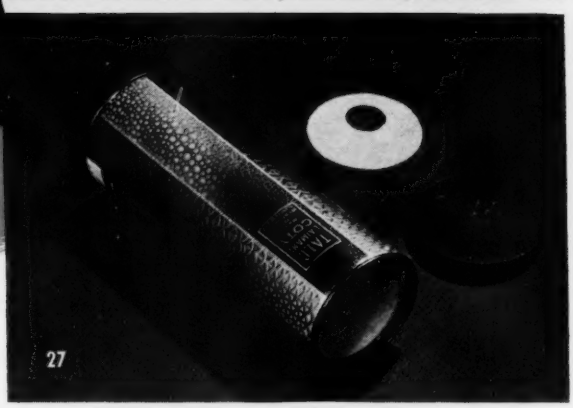
22 & 23—Two views of the same box, which is a fabric covered jewelry container; (Upper) box open to display contents as mounted on satin covered interior pads. (Lower) Same box closed reveals strong construction for protection of contents as well as handsome appearance of a gift container. Photo, Mason Box Co.



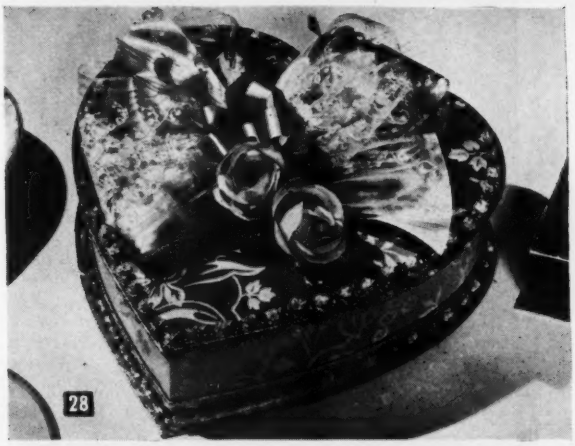
24 & 25—Hinged-lid box with projecting top and bottom, ribbon tie; inverted die-cut platform tray for support of contents. Photo, Warner Bros. Co.



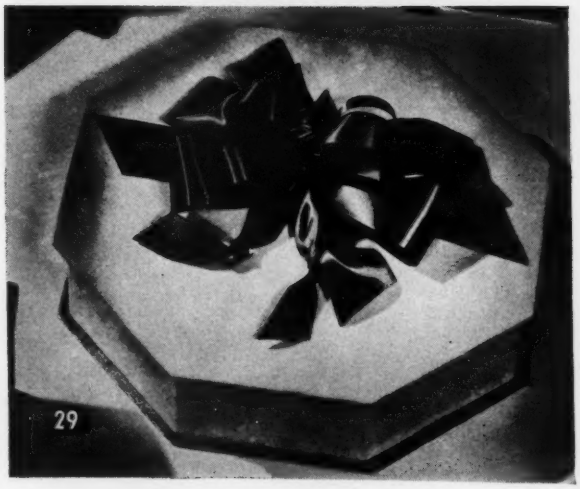
26—Round powder drums with flush edges, domed top covers and projecting edge bases. Photo, F. N. Burt Co., Inc.



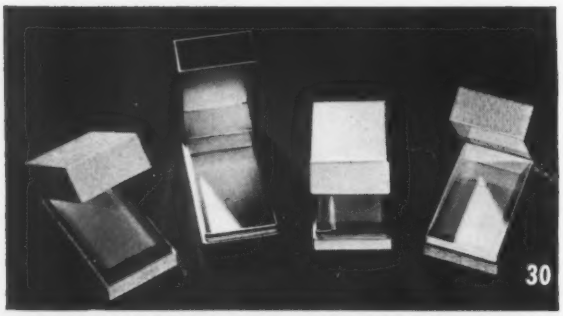
27—Cylindrical powder container with metal ends; plastic sifter top which snaps on over a felt disc. Photo, W. C. Ritchie & Co.



28—Decorative confectionery box, heart-shaped for seasonal appeal; fabric covered; extension edges on base and top. Photo, F. J. Schleicher Paper Co.



29—Gift box for confectionery, octagnoal shape, extension edges on top and base, appliqued ribbon decorative bow. Photo, F. J. Schleicher Paper Co.



30—Group of small hinged-lid cosmetic bottle boxes, fancy paper covered and lined. Edgings of various colors increase decorative effect. Photo, F. N. Burt Co., Inc.



31—Box for novelty perfume bottle with solid projecting-edge base and receding secondary die-cut base; top is truncated pyramid with labels applied separately on all four panels. In background is die-cut supporting member of plain chipboard. Photo, Dennison Manufacturing Co.



32—Box for hand-made perfume bottle has projecting base and upright back panel; various parts satin covered. Photo, Dennison Manufacturing Co.

33—Novelty container for cosmetics; box is tight-wrapped in fancy paper; has three separate removable trays to simulate drawers of chest. Photo, Warner Bros. Co.

34—Container for men's toiletries—oval case with lid flaps and snap fastener. Interior divider protects contents and facilitates packing. Photo, Warner Bros. Co.



Special types of set-up boxes

General construction, advantages and functions of set-up boxes have been described in the preceding pages of this section. There are, however, many set-up boxes designed to fulfill specific requirements. These special types of set-up boxes fall into five major categories: mailing boxes, metal edge boxes, fitted boxes, drawn boxes and boxes which afford visibility—all of which will be discussed in the following articles.

Mailing boxes

by Ralph L. Harden

Containers used for postal shipments are generally termed *mailing boxes*. Specifically the term covers both folding and set-up styles made from fibre, corrugated and paperboard. For the purpose of this article, however, we are considering only the set-up, paperboard type. In this category, the designation applies to small (usually under 15 united inches) boxes having some closing device which obviates the necessity of additional wrapping and tying, or sealing with gummed tape. Also, owing to the fact that ordinary grades of paperboard do not have the strength to impart sufficient protection, manufacturers specializing in this type of box use special grades of board having a wood pulp content which imparts greater strength to the finished box. The Mullen, or "pop" test, is the usual measure of strength of such boxes as it comes nearer to duplicating the stresses usually found under mailing conditions.

The original closing device for mailing boxes was the metal fastener which, attached to the ends of the base, protruded through small slits in the cover. On being bent down, they anchored the base and cover together, thereby doing away with additional wrapping and tying. These metal fasteners have been improved from time to time and the latest improvement is a fastener made from smooth wire instead of flat stock, which overcomes the possibility of cut fingers from sharp edges.

Upon the increased use of sealed mail for packages, particularly registered and air mail, such mailing boxes were also offered with sealing flaps which, being an integral part of the cover wrap, allowed the package to be sealed without use of further wrapping.

There are numerous variations and combinations of these two methods of closure which give a type of mailing container for use in every class of mail. For fragile merchandise or liquids of four ounces or under, either single or double corrugated linings are inserted in the boxes to give greater protection. For combination mailings which include a first class letter, there are several types of mailing boxes which include a letter compartment, or envelope on the top of the box. There are also several types of mailing boxes manufactured for returnable shipments which, by means of a cut-out in the cover and a reversible address card, allow convenient return to the sender.

Today, there are numerous concerns in all sections of the country specializing in mailing containers for every type of mailing.

Metal edge boxes

by Elias Wolf

Metal edge is without question one of the most distinctive types of paper box in use today. A person who had never consciously seen one before would identify it instantly by the metal-stayed corners that give it its name.

(Continued on next page)

1



1—Set-up mailing boxes of paperboard are employed for many products. The assortment illustrated here includes containers for samples, for stationery, for metal parts. The metal clip of the mailing box fastens the package securely while at the same time permitting for easy postal inspection. Photo, Mason Box Co.



2



3

2—Strong metal edge boxes are shipped to user flat to save space, and set up as they are needed. Coatings assure long life, make them proof against destructive elements. This container is used for a hygrometer. 3—Metal edge box for steel parts. Photos, National Metal Edge Box Co.

Whether metal edge belongs in the *folding* or the set-up box category depends on the point of view. When ultimately ready for use, it is certainly a set-up box. When shipped to the user, however, and while held in storage by the user, it has the space-saving advantage of the folding box. In other words, metal edge boxes are shipped to customers *flat* like folding boxes, and stored that way. As finished boxes are needed, operators working on stayers in the user's own plant join the box corners with the metal stay which gives the boxes their distinctive appearance and which also helps to make them "the strongest paper boxes."

Their advantages

It follows, therefore, that while metal edge may reasonably be called a set-up box, only $\frac{1}{10}$—$\frac{1}{5}$ of the storage space ordinarily required for a sufficient quantity of set-up boxes will be needed for metal edge flats. Generally the "makings" take less space than folding boxes.

Other advantages of the metal edge method, application of which is carefully engineered to fit the special needs of the particular business, are these:

1. Made up only as needed, the boxes are always fresh, clean and attractive when they go to work: box waste and spoilage are practically eliminated.

2. Metal-stayed and using no adhesive, the boxes stand up under humid conditions that tend to break down other paper boxes. Furthermore, they do not attract vermin.

3. The boxboard may be specially treated, making the boxes moisture-, acid- and grease-resistant on the outside; grease- and acidproof on the inside.

4. Box construction and board quality lend themselves to fine printing. Users often get attractive two- and three-color effects by having the flats printed in one or two colors on board of another color. Many employ overall designs. Some use halftone illustrations. In every case the appearance of the printed boxes is greatly enhanced by application of a clear coating on the outside and boxes so treated may be cleansed of fingerprints and grime by merely wiping with a damp cloth.

5. The boxes, made from heavy fibreboard and reinforced with metal at the four corners, are considerably lighter than other boxes giving comparable protection. They are therefore notably economical of shipping space and save postage and express or freight costs. Also, their lightness makes a real difference where handled by women workers.

Box styles and sizes

Metal edge boxes of many styles are seen—full-telescope, one-piece hinge-lid, one-piece drop-front dispensers, pull-drawer shelf dispensers, full-telescope dispensers, one-piece hinge-lid lock mailers and so on—and in a practically unlimited range of sizes. As a matter of fact, boxes may be of almost any length and width and of any depth between one and fourteen inches.

In many instances the same stout boxes that serve so admirably to deliver the goods to customers, produce extra dividends within the manufacturer's plant for material handling and inventory control. Some companies have stated that without the aid of metal edges, in these directions, they could not have met their quotas.

Taking into consideration the many advantages and economies inherent in the packaging method as well as the superior protection afforded, representative concerns in many lines of business have time and again testified that metal edge actually saves them thousands of dollars a year.

Fitted boxes

by William H. Perry

A *fitted* set-up paper box is one to which sections, parts, partitions or other fittings are added for utility purposes, both functional and decorative. Fitted boxes are limitless in scope from the simple single part or scored form, to a highly complex series of died-out parts, trays

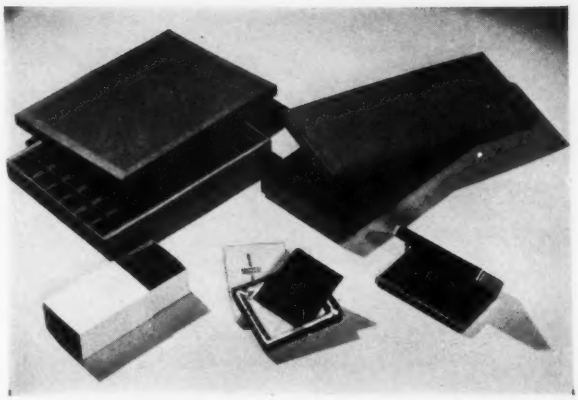
and partitions, which in turn can be treated with quite luxurious coverings.

For example the candy box, hardware, or pharmaceutical type of cross parts, arrived at by simply slotting boards at right angles, have been used to a tremendous extent in the war effort in expediting the assembly of highly technical electrical and radar equipment either at the point of conversion into the finished product or as storage containers for parts in process. Such containers may hold the product either within a plant or for shipment to outside subassemblies.

For demonstration purposes in physics laboratories and in general educational activities, the Polaroid Company has used some very complete and highly developed fitted boxes which very tangibly demonstrate the comprehensive scope of this type of container. These are illustrated as follows (Fig. 4):

Type A—This is a very solidly constructed set-up box covered with a high-grade black paper on base and lid, hot rolled-leaf stamped in silver at the center of the lid in the well known Polaroid trademark and printed inside the cover in black on gray for identification purposes. The fittings in the base consist of a died-out form under which is an inverted form to hold the particular parts of the demonstration set which are of shallow depth, whereas the center section goes to the full depth of the container, again built to fit the particular part, while at one end is an oblong tray. As stated, the entire interior of base, lid, and parts are treated in a gray, giving the whole unit a very professional look as well as being very practical in constant use.

Types B & C—These are other members of the "demonstration family," which are subject to more constant use and are covered in black cloth. The identifying trademark is gained by the use of silk screening. The interiors of both the base and cover consist of trays and died-out



5

5—Fitted and partitioned boxes including containers for metal parts, slide drill box, fitted jewelry boxes. Photo, Cambridge Paper Box Co.

forms, some of which are even covered with rayon flocking for the functional purpose of protecting the various films and lenses as well as giving the entire kit a very professional look.

Within the larger projection-type kit is a box which in turn holds "flocktreated partitions" which are very definitely functional.

One of the best examples of a most highly developed fitted kit, is the ladies' overnight case which is completely equipped with toilet or cosmetic articles. Such fitted kits are generally treated in washable finishes or fabrics and usually augmented with a removable mirror inside the cover, and with side pockets for retaining feminine gadgets.

The fitted kit for mechanical drawing implements is a long outstanding example of a fitted container used almost endlessly in industry and educational institutions.

(Continued on next page)

4



4—Fitted set-up kits for Polaroid laboratory equipment are not only sales containers but strong re-use boxes which must last as long as the instruments. Box at upper left is paper covered, others are cloth covered. Photo, Cambridge Paper Box Co.



6

6—Drawn boxes: (1) Sturdy confection box. (2) Visibility package with drawn base. (3) At right, one-piece drawn box with cushion top; at left, three-piece set-up box with similar appearance. (4) Drawn cover for face powder container. (5 & 6) Effective "bellows" boxes for applying deodorant and veterinary powder. Photo, Heminway Corp.

The family sewing kit remarkably demonstrates a functional as well as a decorative fitted kit.

We believe, from the above descriptions and examples, that here lies a most interesting field for development.

Drawn fibreboard boxes

by Robert E. Crotty

The drawn fibreboard box, as is its cousin, the set-up paper box, is a rigid non-collapsible container produced in three dimensional form delivered to the consumer ready for use. Many unusual shapes are obtained by the drawing process, among them cut corner packages, streamlined covers, bell shaped boxes, round boxes with embossed designs on the covers. All of these can be had at a lower cost than similar designs in set-up box rim and blank construction, thus permitting style and design possibilities heretofore not attempted.

Sturdiness is one of the principal features of the drawn package. The board from which the component parts of the package are formed or drawn is stronger than the newsboard or chipboard used in the rim-and-blank constructed package. Due to the stronger construction of the drawn package, breakage costs in shipping are lessened.

Furthermore, the drawn package will retain its original appearance regardless of constant use. Rim and blank constructed packages show rough edges at the top of the cover when the flush strip and top label are applied. The strength and quality of the board used in the drawing process allows the development and creation of highly embossed decorative effects on the cover top unobtainable in the ordinary newsboard blank.

Odd shaped packages produced by the drawing process can be obtained at a lower cost than shaped handmade packages thereby bringing high grade package requirements down to the medium-priced field. The greater the difficulty in making the package by hand, the greater the economy in the drawn process. The simpler round packages compare favorably in price with the rim and blank.

In one form or another, drawn boxes have been on the market for several years. However, due to the present war emergency, the manufacturers of these drawn products have acquired so much additional "know how" regarding the best kinds of board to use, the additions of plasticizers and resins in the board, the multiplicity of units in the individual drawing process and the use of infra-red rays in the manufacturing process, that the present drawn boxes are far superior to those produced before the war.

It is interesting to note that there is a vast difference between the drawn fibreboard box and the ordinary pressed-out box or cap such as that used for years on the top and bottom of pasteboard salt containers and the carpet tack round box made of pressed caps. In the first place, the drawn box is made of a rag content fibreboard having maximum stretch. In the drawing process, using moisture as an aid, the fibres of the board are elongated so that a much deeper box can be obtained without tearing the side wall of the box. The drawn box is produced under heat, sometimes as high as 400° F. and when a plasticizer is added to the board, the heat sets the board into a box so rigid that it can withstand great force and stress. The pressed-out box or cap suffers by comparison with a drawn fibreboard box.

If a more elaborate and better looking box is necessary, for instance a face powder box or perfume box shaped like a bell or a heart, etc., the top of the lid is depressed and a cotton padded blank covered loosely with silk or satin is set into the depression and the side of the lid is then stripped with silk or satin. The base is also treated in this fashion and the result is a beautiful appearing, sturdily build and unusually shaped box costing less than a similar box made in the set-up paper box manner of blanks set into rims.

In drawn fibreboard boxes for use as containers for face powders or for displaying jewelry, watches, pearls, etc., the entire box consists usually of three parts, namely, the lid, the base and the powder drum or the platform on which the jewelry is displayed. All three of these parts are drawn.

Several years ago, some foreign-made presses were imported which were designed to draw odd shaped boxes in one piece. In conjunction with several board mills, proper stock to stand the stress of drawing has been developed. These machines were imported primarily for the sole purpose of making face powder boxes, but they have also served a good purpose in the war emergency by producing durable threaded caps as a substitute for metal closures for such foodstuffs as coffee, peanut butter, etc.

During the manufacture of these caps in the war emergency period, engineers, chemists, machine designers, board manufacturers and the WPB collaborated with the owner of these presses with the result that a great deal of valuable information on the manufacture of drawn boxes and drawn products has been acquired. This "know how" in the years following immediately after the termination of warfare will be of great benefit to manufacturers who require unusual shapes, sturdiness in appearance and reduced cost factors in fine packages in which to display their products.

Boxes which afford visibility

The technique of the set-up box maker can be—and is—applied to fabricating containers of rigid transparent plastic material. At the present time, practically all the various kinds of transparent sheeting are under rigid control, but just as soon as restrictions are lifted, it may be positively predicted that this form of package will stage a decided comeback. The principal advantage of this container is visibility. This means, first of all, that the nature of the product contained is instantly identified. The beauty and appeal of the contents are enhanced. Unnecessary handling is prevented—and with some products, such as textiles, lingerie, and cosmetics, this is of great consequence. At the same time, the package permits effective display on counter or in window, and in some cases provides a degree of consumer convenience.

But it is important for packagers to realize the limitations of this package. One is cost. The material itself is relatively more expensive, and the fabrication cost is somewhat higher, particularly for the drawn types. As a rule, hand or semi-automatic operations are necessary on the production line, which slow output and increase cost per unit. While as to structural strength these containers can be made adequate for most products, another limitation is the fact that some of the materials are not sufficiently impervious to moisture to serve for certain products. In some cases supplementary packaging is needed.

Up to the time when restrictions set in, the principal materials for transparent plastic containers were cellulose acetate, ethyl cellulose, and vinyl sheeting. Cellulose nitrate has also been used, but its high combustibility necessitates caution in its use. Without a doubt other new types of materials suitable for these fabrications will be introduced as soon as restrictions are lifted, and it may be expected that some of the above mentioned objections will be surmounted.

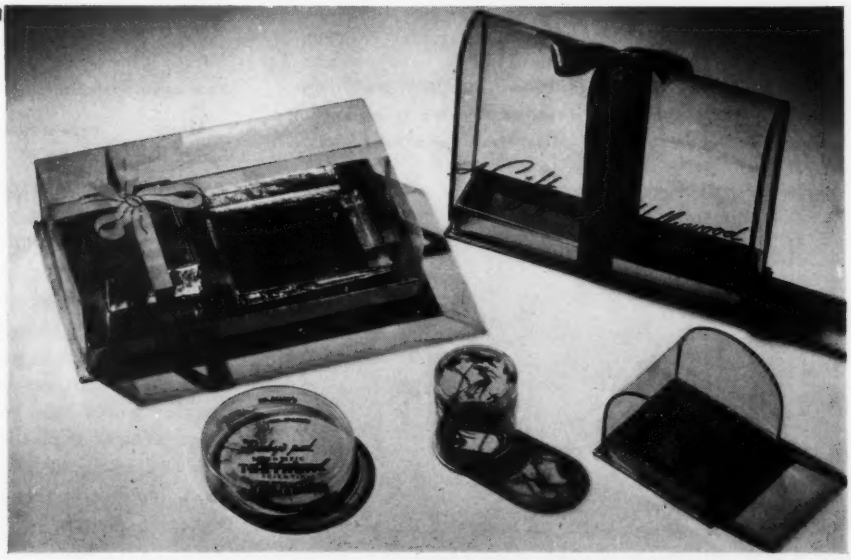
Most of the materials have been supplied in sheets or continuous rolls. Stock gauges range from 0.003—0.020 in., with heavier thicknesses obtainable on special order. Fabrication may be either by the set-up method or by the drawing method. In the former case, pieces are cut to proper size then sealed or cemented together. By the drawing method, the sheet is molded or formed in a single operation by means of dies under heat and pressure. The two methods of fabrication afford a wide variety as to size and shape. For quantity production, the drawn type offers advantages because the die, once made, will last indefinitely. On the other hand, the set-up type is adapted to short runs and permits changes in package structure and design.

Various methods of decorating are possible, including printing with special inks, beading, embossing, silk screen and roll-leaf stamping. Care in design is advised, to make sure (1) that the structure and decoration do not interfere with the visibility of the product, which is the principal advantage of this type of package and (2) that the ornamentation or decoration is properly adapted to the material. (Also see *Fabricated Containers*, p. 584.)

7



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7—Visibility of product is an important factor in this tray box with a rigid drawn transparent plastic cover. Photo, U. S. Envelope Co. 8—These set-up visibility boxes lend distinction to a number of products. To make them, sheet material is cut to proper size, then sealed or cemented together. Photo, W. C. Ritchie & Co.

Molded pulp packages

Combinations of new or reclaimed fibrous paper pulp with binders of plastic resins or certain other chemicals are employed in fabricating molded pulp containers. The paper pulp may be a mixture of sulphite and kraft, its degree of strength depending upon the amount of kraft used in the mixture. The containers are cast from molds of bronze or other metals, previously made from plaster models of the desired shapes.

Molded pulp has been used extensively by the poultry industry to protect eggs from breakage during shipment. Millions of molded pulp and pressed pulp pie plates are used annually in the baking industry. These are made with dies and plungers, and are limited to a dish-shaped unit. Another important use is for the protective sleeves over bottles of liquor. In more uncommon shapes, molded pulp, made by the blown method, is used widely for making decorative novelty containers for candy, lingerie, hosiery and all manner of dry merchandise for which an individualized container provides striking counter display. Some 10,000,000 molded pulp units, like the pumpkins seen on candy counters, were sold in chain and syndicate stores annually prewar. Custom-made molds are also important for trademark identity.

Molded pulp containers have many advantages:

1. They are light in weight.
2. They may be seamless because two halves can be molded in one piece.
3. They are crush resistant.
4. They offer excellent opportunity for distinctive design and individuality of shapes.

The two important processes for making molded pulp containers are as follows:

1. *Suction method*—This process is used for mass production of the flat dish types of containers, such as egg containers and pie plates. The molds, drilled with holes, are attached to the spokes of a rotary conveyor. A fine screen fits over the outside of the mold. As these molds move around the conveyor they are submerged into vats of the pulp mixture. By suction the required amount of the pulp mixture to make the container is lifted from the vat against the screen and pressed by male and female dies. The mold then moves on; the completed container is finally removed from the mold and put through the dryers. The complete operation is automatic and it is possible to make large quantities with great speed and at very low cost.

2. *Blown pulp*—Some novelty molded pulp containers, such as boots, barrels, liquor bottle sleeves, figurines, are not formed with dies and plunger but are made by the blown-pulp method. A bronze shell or cavity drilled with holes is lined with a metal screen the same shape as the shell. The force of gravity causes the pulp mixture to fill this cavity and air pressure forces it against the screen within the mold where it is dried by means of air which has been super-heated.

When the unit molded is dried sufficiently, the mold opens automatically, the unit is removed and passed along on a conveyor for further drying. The container is then ready for the application for decorative effects. Production reaches about 20,000 containers a day.

Decoration

Color effects may be achieved by dyeing the pulp material to the desired shade or by applying color with a brush or spray. The containers may be lacquered to provide a high glossy lustre. Lettering and trademark designs may be incorporated at the time of molding by novelty embossing or debossing. Labels may be affixed later.

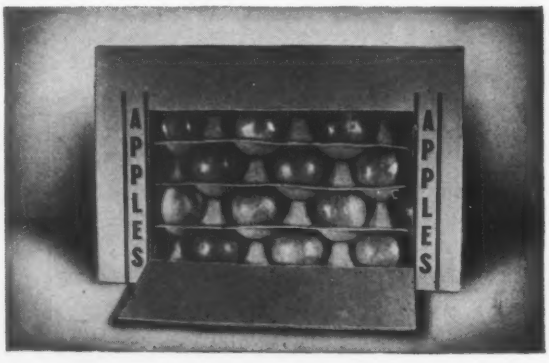
Molded pulp containers are obtainable in stock molds. When an unusual design is required, an individualized mold may be made. Bronze molds may be made on the average from $150 to $500.

New developments

Many new uses and developments of molded pulp may result from material shortages due to the emergency economy. Reports maintain that experiments have been conducted to develop paper pulp as a substitute for cork. In addition to this, molded-pulp protective pieces for corners of furniture during shipment have been used successfully for corrugated materials. They are easy to handle because they can be made in the exact shape required by the product which is packed.

Another recent development is a molded-pulp product carrying a synthetic resin content, reputed to have all the advantages of plastic molding compounds plus greatly increased strength and latitude in color and decorative effect. Eventually this material may have a part in the packaging picture.

1—Molded pulp trays, moisture-resistant and oil-sprayed, protect eggs, apples and other perishable foods. Individual nesting keeps each unit in original position during shipping. Photo, Mapes Consolidated Mfg. Co.



What to tell your box supplier

by T. S. Duncanson

Innumerable factors enter into the designing of a package. These factors must be given due consideration from all aspects, for the box manufacturer can serve his customers best only if very complete information is given to him when a request is made for a quotation or for the design of a new package. Thus, in order to achieve a package which will be competently designed and developed and accurately priced, there are certain pertinent facts which must be known and which also must be clearly presented to the box manufacturer before he begins to make his calculations.

This article will deal with the fundamental information which should be assembled before ordering a new package in any of the following types—folding carton, set-up box, fibre tube container or transparent package.

General specifications

1. When requesting the development of a new package, always give to the manufacturer samples of the articles or substance to be packed. This will be a most important aid to the new box supplier.

It is surprising to note the number of requests which are received by box manufacturers to design and construct new packages—and all the information received is that the package is to hold a pound of this substance or a jar this or that shape or four articles such and such a shape. This sort of information is, of course, entirely inadequate. It is, therefore, most essential that the product accompany the inquiry.

2. Another piece of information which the box maker would like to receive is the price at which the article will be sold to the retail trade, as well as the approximate figure you plan to spend for the new package. A knowledge of these figures will influence his judgment in design and construction.

3. Inform the box maker what class of box you have in mind: a) folding carton, b) set-up box, c) fibre tube, d) transparent package.

4. In the case of solid articles such as bottles, jars, cloth pieces, etc., it is well to advise the box maker of the position in which you would like to have the article packed for display purposes.

5. Inform the box maker the quantity of an initial order, as well as the quantity that you eventually expect to use.

This will help the manufacturer to decide what method of manufacturing he will employ both in regard to the initial order and any anticipated larger quantities for use in the future.

6. If the box maker is expected to do the creative art work for the new package, suggest the color scheme, or if you have a standard color scheme, send along samples of this work. Give him in a general way—preferably a rough pencil sketch—the idea as to design and copy that you wish created. With this as a starting point he will be in a better position to proceed.

The above information is general data which any box maker really needs to possess when requested to develop a new package, whether it is to be the folding carton style, the set-up box, the fibre tube package or the transparent package.

Prices for established packages

When requesting a price on a package which has already been established, always send a sample of the package as well as the contents to the new supplier. Although you may give the usual specifications to a new supplier, it would prove to be of mutual advantage for him to see the package as you have received it in the past. There are sometimes many things built into a package which are not called for in general specifications, and the new supplier should have an opportunity to study these. There are also many things that *should* be built into a package which the proposed new manufacturer may suggest to your advantage.

Folding cartons

The general specifications needed for an intelligent quotation on folding boxes are as follows:

1. Give the quantity to be purchased. In the case of two or three different folding cartons which can be run in combination, mention the minimum and maximum quantity of each that you would accept. This would give the manufacturer some latitude in laying out his combination run, which is to the purchaser's advantage pricewise.

2. Specify the kind of board to be used, such as patent white, bleached manila, clay-coated, etc., also the type of back, such as newsback, manila back or white back.

3. Specify the finish, if any, for the inside of the carton, such as wax or any special coating to be used for a special purpose.

4. Specify the construction, such as reverse tuck, straight tuck, glued end, etc.

5. Specify the exact size.

6. State whether the carton is to be hand filled, filled on fully automatic or semi-automatic machines. You might also mention the name of the filling machine you use. Most carton manufacturers have had experience on all types of filling equipment.

7. Specify the number of colors in the design and also the finish, such as overprint varnish, spirit varnish, lacquer or any other unusual finish that you may require.

8. If the product has already been packed in a folding carton, by all means send a sample.

By sending a sample it will be possible to indicate whether or not the specifications are supposed to apply to that carton. In this event the carton maker will be in a position to check them against the sample, or to indicate

in what respect the specifications are intended to depart from the sample.

9. Inform the manufacturer whether or not you can supply working drawings, original plates, electrotypes, lithographing positives or negatives, original sketches or any work or material that has been used in the past for reproducing the design.

These factors all affect the price of the carton. If it is not possible for you to supply anything along the line of art work or plates, mention this fact in your inquiry. This will avoid misunderstandings, and will permit the manufacturer to plan accordingly.

10. If there are any special packing specifications that you require, such as tray packing, tying, bundle wrapping, or special size corrugated cases, this should also be known by the manufacturer at the outset.

11. Specify the f.o.b. point and whether or not you are in a position to take the entire run in one shipment or if you require delivery over a period of time.

If the quantity is substantial and the box maker does not have to provide storage but can ship lots as manufactured, this will also have a bearing on your price. Details of this nature should be supplied for the manufacturer's consideration before contracting.

Set-up boxes, fibre tubes, transparent packages

The general specifications, such as size, shape, construction, quantity, etc., for set-up boxes, fibre tube containers and transparent packages are the same as those required for folding cartons. There is, however, additional specific information with which a box maker would like to be supplied when he is requested to make samples and to quote prices on any of these three types of packages.

Set-up boxes—In the case of the set-up box, the following suggestions are made:

1. If it is an established package, by all means send a sample to the box maker indicating, of course, any changes that you may have in mind.

2. If it is your intention to ask for an improved construction or a cheaper construction, give in detail your ideas along these lines.

3. Many set-up boxes in round, square and odd shapes are now being made on automatic equipment provided, of course, the quantity will warrant the machine setups. It is wise, therefore, to inform your box maker of the initial quantity of boxes that you propose to purchase and also tell him the quantity that you have used or anticipate using during the period of a year. The box maker may be in a position to offer you a substantial saving by making the boxes automatically, if you could purchase six months' or a year's supply.

4. If the box has printed or lithographed wraps or labels, inform the manufacturer whether or not these will be supplied by you or if they are to be supplied by the box manufacturer. Of course, if the box manufacturer is to supply the labels give him complete information as to whether or not you can furnish any of the original plates or engravings necessary for the reproduction.

5. If you are to supply the lithographing, it is always the best procedure to have your box maker work closely with your printer or lithographer. This will avoid a good deal of misunderstanding in the future with regard to incorrect layout, cutting sizes, positioning, etc.

6. When requesting a development of a new combination set-up box, outline to the box manufacturer the approximate shape and construction that you have in mind, either round, square, telescope shouldered or lid style. Also explain the position at which you would like the articles displayed, such as lying flat or standing up.

7. Set-up boxes can be constructed in a wide price range. Therefore, inform the box manufacturer in your original inquiry the approximate price you can afford to pay for the set-up box. Without this information his first efforts may be futile.

8. Many set-up boxes of all sizes and shapes are packed in individual and sometimes multiple containers. Give complete specifications as to the container packing, if any, and also any other special types of packing that you may require.

Fibre tube packages—When requesting a quotation on a fibre tube container:

1. Send along a sample.

If the article or substance has not been previously packaged, inform the proposed manufacturer the approximate sizes and shape that you require. It may be necessary for the box manufacturer to alter these slightly to fit his equipment, and this should be known prior to contracting.

2. Indicate to the manufacturer what form of top and bottom closures you prefer and also whether or not you would like the bottom closure or top closure sent separately for filling purposes.

3. Send the manufacturer a quantity of the substance to be packed, if it is a powder or granules, so he can make siftproof tests.

4. Give him complete details as to the characteristics of the material. Tell him if it will lose its odor, if the package is not airtight, or if the material is hydroscopic or any other peculiarities of the substance to be packed.

Transparent packages—Although transparent packages have been on the market for some time before the war, there will be many new types and constructions that will be offered to the purchaser after the war. When requesting information on this type of package:

1. Send the articles or substance to be packed and give the box manufacturer an idea as to the shape and construction you have in mind.

2. Tell the box maker the price range permitted for the new package. This is important so that he can decide immediately whether or not the package can be made from transparent material or whether or not it may be a combination of transparent material and cardboard.

3. Specify the quantity required.

4. Give information regarding printing copy and other general information so that the box maker can make a complete quotation.

If the purchaser of packages would work more closely with his supplier and give him more complete information such as described above, much time would be saved in the development of new packages and a good deal of misunderstanding would be avoided.

ADVERTISING FOR...

CARTONS AND BOXES


F.N.BURT



A big name in packaging

F. N. Burt Company is known for its large quantity high speed automatic production of small square, round and oval set-up boxes. Many of America's leading cosmetic and drug manufacturers rely extensively on F. N. Burt production to meet their mass marketing requirements. Quality is not sacrificed to speed in Burt packages. They are known for their economies achieved through the use of Burt's own specially designed and specially built production equipment.

During the war, Burt's engineering technique proved itself by creating a number of new types and adaptations of paper packages.

During the time of shortages, Burt helped packagers to get to market with paper closures, paper cans with various types of dispensing closures and other developments. Some of these, we believe, will prove both economical and practical in peacetime production.

F. N. BURT COMPANY
INC.

500-540 SENECA STREET, BUFFALO, N. Y.

New York City - Kansas City - St. Louis - Atlanta - Chicago - Los Angeles
Boston - Cleveland - Cincinnati - Memphis - New Orleans - Minneapolis

SAN FRANCISCO: 220 Bush Street, Yukon 0367

NEWARK, N. J.: 915 Military Park Bldg., Phone Market 3-0788

CANADIAN DIVISION:
Dominion Paper Box Company, Ltd.
469-483 King Street, West, Toronto 2, Canada



A LONG-RANGE VIEW...

OF AN EASY WINNER!

But it isn't worth a dime to you unless you placed your bet on him before the race began.

The post-war race will be that way too. As machines start to roll on civilian goods again, sales departments will be on the jump for new markets. Old customers' orders will be hanging in the balance. The man who can deliver the goods will get the business.

Delivering goods means packaging, and package-planning *now* will help avoid being left at the post when the feature event begins. The Warner Craftsmen have kept in training during war years, successfully meeting untold problems, and they are familiar with the "best bets" in packaging materials to help sell your post-war product.

A Warnercraft survey of your needs *now* will give you the inside tip you'll need later . . . the close-up of the long-range picture.



WARNERCRAFT

"THE FINEST WORD IN PACKAGING"

Makers of set-up and folding boxes of all types, transparent acetate containers, hand made specialties, counter displays and dispensers.

THE WARNER BROTHERS COMPANY

Main Office and Factory: 325 Lafayette Street, Bridgeport, Conn.
New York Sales Office: 200 Madison Avenue, New York, N. Y.



Soon—

We hope, soon, to make available in volume, Smithcrafted* containers in the same wide variety of design and construction that has made them outstandingly successful as a gift packaging medium.

We will be glad to discuss designs with you now for possible future production.

** A process of unusually deep bas-relief embossing on sheet materials—metal, plastics, coated papers, fabrics—and applied over frames of cardboard, wood or metal.*

THE S. K. SMITH COMPANY

3857 N. WESTERN AVENUE CHICAGO, ILL.

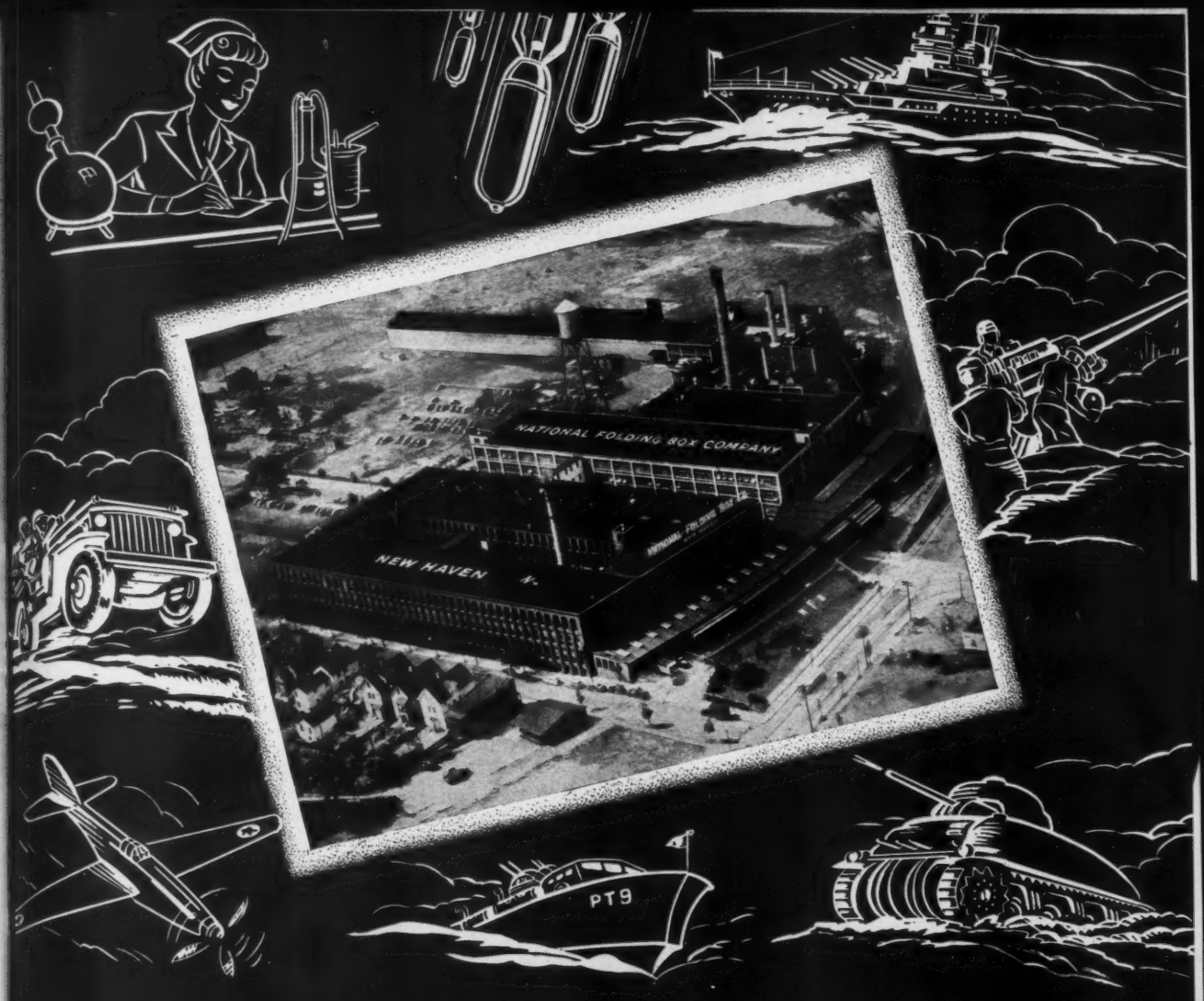
New York Office, 52 Vanderbilt Ave., MUrray Hill 9-8290

SMITH CRAFTED CHICAGO



An Important Name

In The Field of Packaging



Until the war is over-

We believe it is our plain duty to give first consideration to the pressing needs of the armed forces, for without complete victory there is no hope or security for the American way of life we all cherish so highly.

Because of our intimate knowledge of the critical need of paperboard in the war effort we have taken a leading role in awakening a public consciousness of the need of saving every available scrap of paper and getting it into the fight.

It is our conviction that only through a united and concentrated effort on the part of all industry right now, to furnish what our armed services need, can we speed the day when our boys will come victoriously marching home, and we can once more resume normal living.

While we cannot accept any new accounts we are confident we have lost none of the skill and "know how", which made "packaged by National" synonymous with the highest quality in folding paper boxes, and will continue to be an all-important factor in post-war packaging.

NATIONAL FOLDING BOX COMPANY

MILLS and EXECUTIVE OFFICES · NEW HAVEN 4, CONN.

405 Lexington Ave., New York 17, N. Y. • 143 Newbury St., Boston 16, Mass. • 1201 Chestnut St., Philadelphia 7, Pa.

XUM

Gateway to the 5 Billion Dollar Packaging Market!

When you want to reach the five billion dollar packaging market, remember these facts:

MODERN PACKAGING IS THE ONLY A B C PACKAGING PAPER

For seventeen years Modern Packaging has been delivering consistent advertising results for the industry's leading suppliers of bottles, cans, cartons, boxes, paper, machines . . . It has served as the gateway through which those with new ideas and facilities have come to market.

Today, packaging is a specialized field . . . one whose present hugeness will doubtlessly be even larger after reconversion.

Reconversion is as important to packagers as their next meal. They want to know if their war-time packages will eat at the peace-table—whether population shifts will affect consumer hunger for their products—what new consumer buying habits will do to sales. Packagers are a group of industries with common hungers and appetites. For sustenance, packaging executives digest Modern Packaging magazine every month. Here they find the particular news to fit their specific problems. For this reason, suppliers find it an extraordinarily productive advertising medium.

CIRCULATION

A B C—12-31-43

Established 1927. Single copy .50; per year $5.00

Total net paid excluding bulk (6 mos. aver.)	6,064
Total net paid including bulk	6,116
Advertisers	79
Advertising Agencies	59
Samples to prospective advertisers	171
All other unpaid distribution	2,649
Total distribution (6 months average)	9,074

DISTRIBUTION

Modern Packaging, through its high subscription rate ($5.00 per year), reaches the key men in the industries it serves. The phrase "key men" is used because Modern Packaging has sought, through all the years of its existence, to so pattern its editorial pages as to attract, interest, inform and advise those men in all industries who determine packaging trends and who control the purchase of every product that goes into the creation of packages and displays. How successfully Modern Packaging has succeeded in this self-set task may best be judged by the fact that it now enjoys the monthly readership of:

- . . . **3032** in the Food industries, including Bakers, Beverage mfrs., Canners and Preservers, Confectionery mfrs., Meat packers, together with those responsible for the merchandising of Coffee, Tea, Spice, Flour, Rice, Cereal and Dairy products.
- . . . **1297** in the Drug and Cosmetic industry including those responsible for Cosmetics, Toilet and Chemical preparations, Soaps, Drugs and Medical Supplies.
- . . . **618** in the Giftwares fields including Jewelry, Novelties, Games, Sporting Goods, Silverware, Dolls and Toys.
- . . . **244** policy-making executives in the Tobacco industries, comprising Cigarettes, Tobacco and Cigars.
- . . . **415** in the Textile field.
- . . . **888** executives among the producers of Hardware and related products, including Appliances, Paints, Oils, Tools, Varnishes, Waxes.
- . . . **277** readers among Retailers and Distributors including Syndicate and Department stores, Voluntary Chains, Mail Order Houses, Distributing Jobbers.
- . . . **1053** in the Paper products industries including producers of Stationery, Tissues, Playing Cards, Sanitary Specialties and Drinking Cups.
- . . . **1138** package producers whose capacities range from that of salesman to president.
- . . . **112** Miscellaneous, but directly interested followers of packaging progress.

ADVERTISING RATES

Rates effective January 1, 1944 (Card No. 14)

Card received December 31, 1943

Agency commission 15% on space rates only; cash discount 2% 10 days; net 30 days. No agency commission allowed on color, inserting or bleed charges:

General Advertising	1 ti.	6 ti.	12 ti.
1 page	$230.00	$215.00	$200.00
½ page	130.00	120.00	110.00
¼ page	75.00	70.00	65.00

MODERN PACKAGING MAGAZINE

PUBLISHED BY BRESKIN PUBLISHING COMPANY
122 EAST 42nd STREET, NEW YORK 17, N. Y.
Chicago • Washington • Cleveland • Los Angeles

Member of Audit Bureau of Circulations



a basic packaging material throughout industry

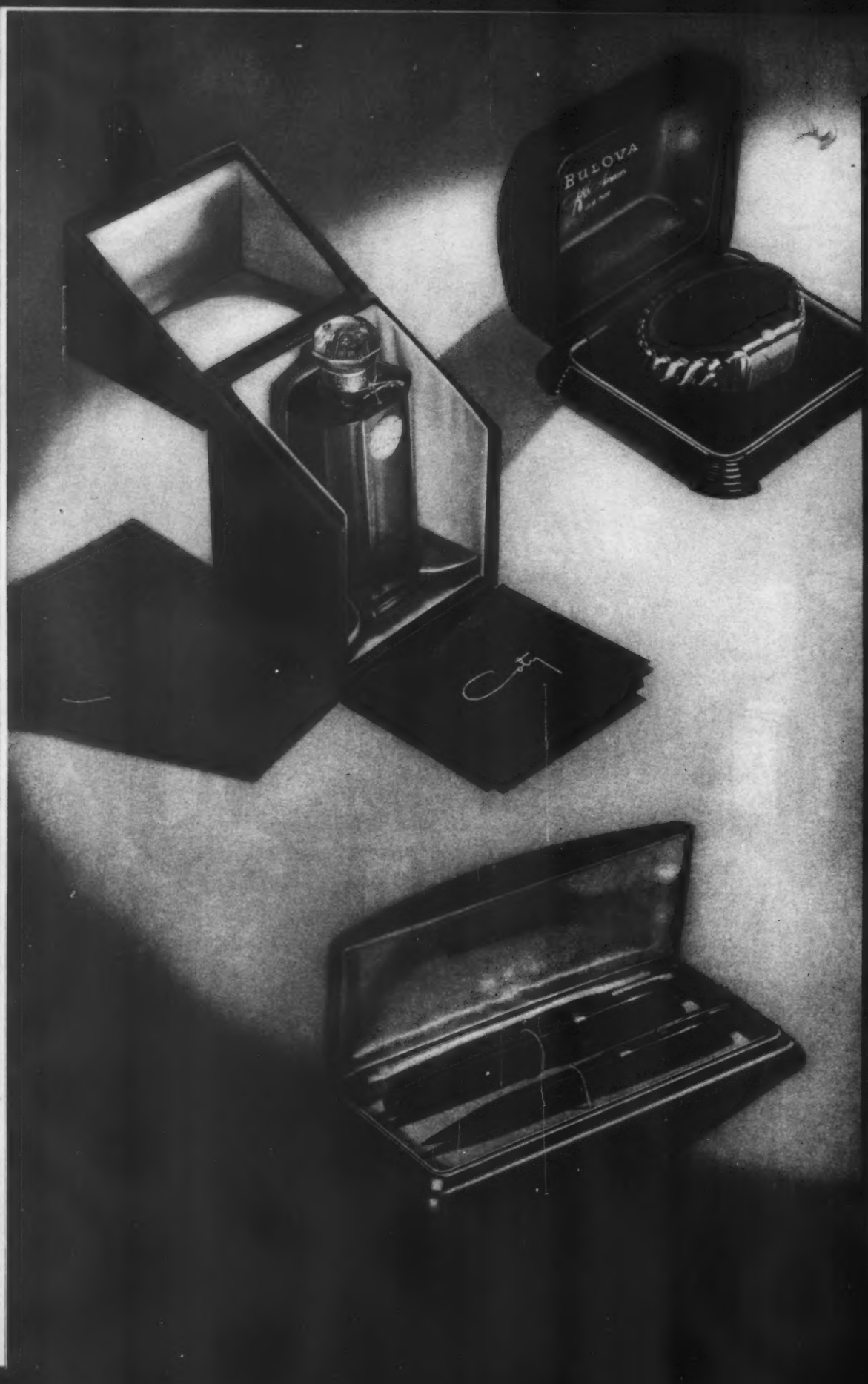
Ridgelo
CLAY COATED
REG. U.S. PAT. OFF.

Made at Ridgefield, N. J., by Lowe Paper Co.

BOX BOARDS

PROTECTIVE FINISHES

LAMINATIONS


BULOVA

INSPIRATIONS FOR TOMORROW

Each year's boxes and displays by Arrow have always been "predictions of things to come." Manufacturers with an eye to the future are invited to consult Arrow when planning boxes or displays pointed toward tomorrow's buyer.

Arrow
BOXES AND DISPLAYS

ARROW MANUFACTURING COMPANY,
INCORPORATED
FIFTEENTH & HUDSON STS., HOBOKEN, NEW JERSEY



Arrow is proud that it is today one of the country's largest suppliers of the boxes which hold the medals for the heroes in our Armed Forces.

XUM



No. . we can't say we make cartons which actually "whistle" at customers from the shelf or counter . . . or grasp them by the hand. But into our creations is built a merchandising appeal and attraction which literally *compels* attention.

Our post-war planning has been under way for months. We know *you*, too, *must* be alert in post-war thinking.

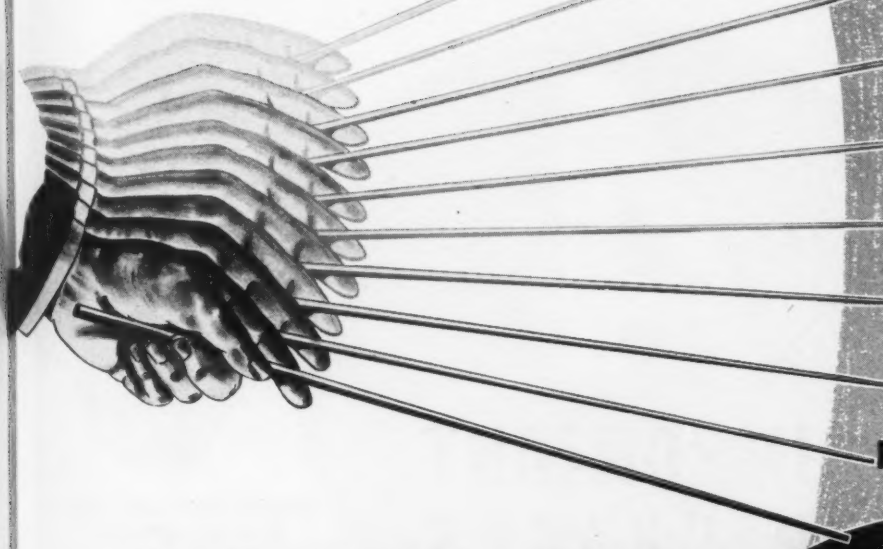
Why shouldn't we get together and "swap" a few ideas as to how *your* product can again move off the consumer shelf by Peacetime "Power of Attraction?"

ACE CARTON CORP. ACE CHICAGO Creators

ACE CARTON CORPORATION

Folding Paper Cartons • Folding Displays • Folding Containers

5800 W. 51st STREET, CHICAGO 38, ILL. • • CRAwford 0111



BAGS
CARTONS
OVERWRAPS
SPECIAL COATINGS
COMBINATIONS
LAMINATIONS
CELLOPHANE
FILMS
FOILS

MARATHON

Builds Packages From ALL These Materials

The objective of Marathon* packaging recommendations is the correct package for your job. The materials or combinations of materials best suited to the requirements are chosen. The package construction and design which is best adapted to its needs is selected. The entire job can be done by Marathon. This singular service, combining manufacturing and converting operations, has achieved remarkable results in package development. We welcome direct inquiries which will be referred to our experienced field representatives.



*The trade name "Menasha" has been changed to "Marathon." There is no change, however, in sales policies or personnel which will continue to pace the field in package development.

MARATHON CORPORATION

MENASHA, WISCONSIN

Formerly The Menasha Products Co.

XUM

QUANTITY PRODUCTION OF



SHU-PAC

Economical folding cartons for shoes.

VUE-PAC

Window carton with grease-proof, moistureproof liners for the food field.

STURDI-PAC

Strong set-up boxes for many types of products.

FLASH-PAC

Folding carton, knocked down but ready for set-up in a simple operation.

Executive Offices and Folding Box Division
1619-29 Warner St., Baltimore 30, Maryland
Set-Up Box Division — 118-20 North Pack Street, Baltimore 1, Maryland
Norfolk - Portsmouth Division — Ninth Avenue and High St., Portsmouth, Virginia
Affiliated Company — Pennsylvania Paper Box Co., Inc., Littlestown, Pennsylvania

DESIGNERS GORDON MANUFACTURERS - LAVIN



SALE IN DOUBT!

DESIGN YOUR POSTWAR PACKAGE TO WIN THIS ALL IMPORTANT POINT-OF-SALE DECISION . . .

Your package is the key to capturing point-of-sale buying impulses. The ever growing trend to self-service shopping puts consumer appeal at the top of the list of postwar packaging prerequisites. Famous EYE-PETIZED labels, cartons, and wraps—created by "U-S" designers and produced by "U-S" skilled craftsmen—are winning point-of-sale buying decisions for many food products. The merchandising power of food packages with eye and appetite appeal has been definitely proven in many food fields by "U-S" EYE-PETIZED packages. This experience in the creation and production of sales-getting packaging materials is available to you in planning your postwar packages. Call the "U-S" representative near you for consultation on your consumer packaging problems.

U S PL

PACKAGING MATERIALS WITH *Shelf*-CONFIDENCE



WRAPS
LABELS
CARTONS

THE UNITED STATES PRINTING & LITHOGRAPH COMPANY

HOME OFFICE: 382 BEECH STREET, CINCINNATI 12, OHIO ★ SALES OFFICES IN PRINCIPAL CITIES

5 Great "U-S" Plants . . . Producing Highest Quality Packaging and Advertising Material



PLASTICS



INC 1812

SOCIETY OF THE PLASTICS INDUSTRY SPI

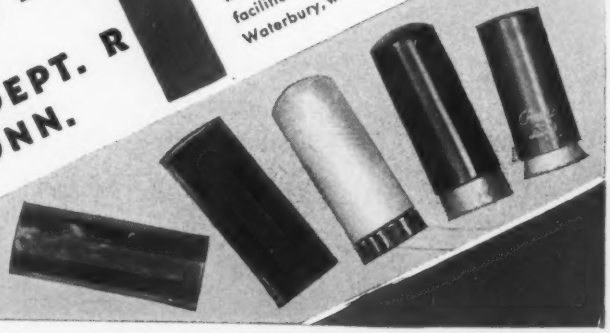
WATERBURY Moldings of Merit

In the design and production of Plastic Containers, Waterbury Companies has available technical experience and mechanical skill seldom found in a single organization. This is a tremendous advantage to a manufacturer of a cosmetic or toiletry product where packaging costs must be kept at a minimum without sacrifice of style, strength and operational convenience.

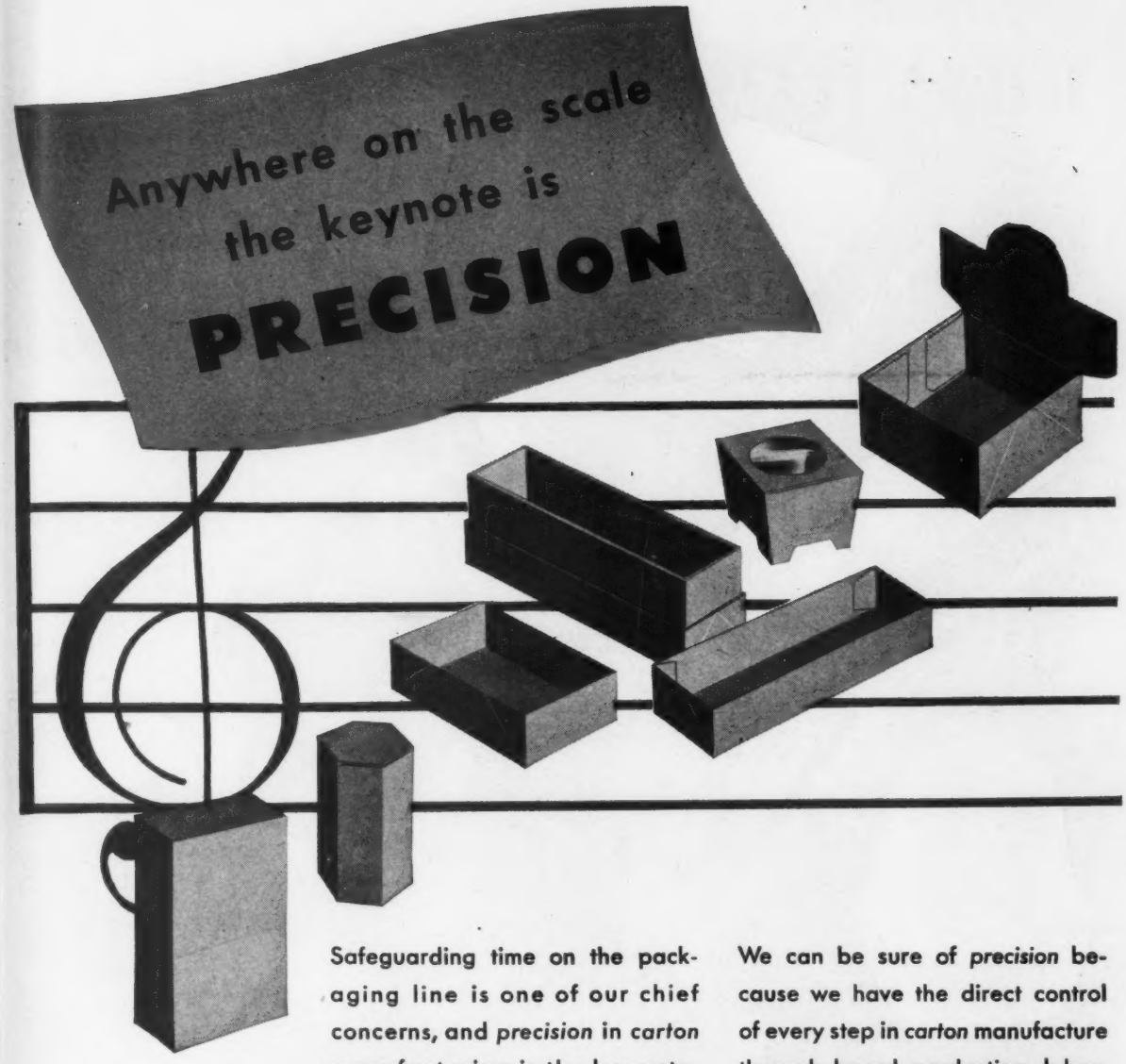
Many world famous products are packaged in Waterbury Moldings of Merit. We invite inquiries from manufacturers who have a container problem to solve. Our engineers, chemists and production experts will gladly advise you as to the most economical and efficient way to create the most suitable and attractive type for your product.



Waterbury Companies, Inc., serves American industry with a diversified range of plastic products . . . from the simplest electrical part to the most intricate custom-molded device; combining plastics with metal inserts when required. Six complete manufacturing divisions, three laboratories and facilities for large scale production. Remember Waterbury, when you need plastics for any purpose.



WATERBURY COMPANIES, INC.
ESTABLISHED 1812
PLASTICS DIVISION, DEPT. R
WATERBURY, CONN.



Safeguarding time on the packaging line is one of our chief concerns, and *precision* in *carton* manufacturing is the keynote.

Each *carton* is a piece of *precision* equipment.

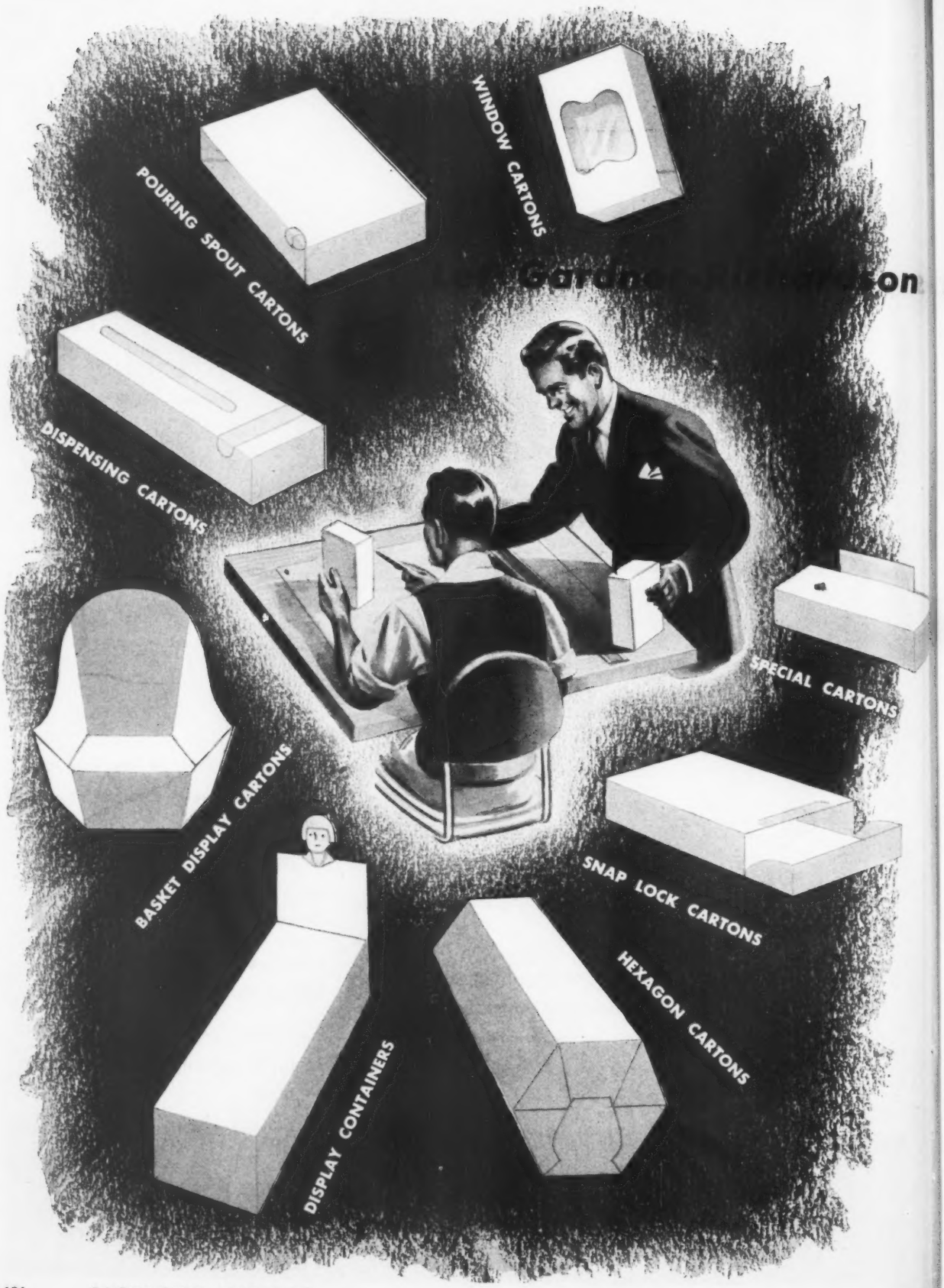
It falls into step with your packaging machinery as smoothly as the cams, gears, and levers which are a part of the machine itself.

We can be sure of *precision* because we have the direct control of every step in *carton* manufacture through board production, laboratory testing, and trained personnel for precision conversion.

Our clientele lists some of the largest *carton* users in the world.

Let us show you how to save time and money by **planned packaging.**

THE OHIO BOXBOARD CO.


WINDOW CARTONS
POURING SPOUT CARTONS
DISPENSING CARTONS
SPECIAL CARTONS
BASKET DISPLAY CARTONS
SNAP LOCK CARTONS
HEXAGON CARTONS
DISPLAY CONTAINERS

on specialists

...give your cartons advantages that sell

A NEW SERVICE FEATURE on your folding cartons—that may be what you need to get a big jump on competition . . . or perhaps a novel dispensing or display carton can give you a selling edge. And now's the time to find out! For in the competitive days ahead, you'll want every sales-plus you can get.

Put your problems up to Gardner-Richardson packaging experts . . . the men who have come up with some of the most outstanding carton developments in recent years . . . the famous novelty lock cartons, unique dispensing cartons, bulk display cartons, cartons with pouring spouts, automatic lock ends and many other sales and service features.

And that's not all. These Gardner-Richardson technicians set no limit on the type of folding carton problem they'll tackle. If you want better filling machine performance, easier assembly, better product protection or point-of-sale display, let their ingenuity and experience take over. Discover for yourself what so many of the largest buyers and users of folding cartons know . . . that Gardner-Richardson is a key source for fresh and satisfying solutions.

Specialized Carton Boards Created by Gardner-Richardson

COATED LITHWITE. The first carton board ever made and coated in one continuous, high-speed operation. Smoother. Whiter. Prints with unusual color brilliance. Tested. Proved and improved for over five years.

GREASENE. For the economical protection of products with grease or oil content.

HYDROTITE. A special board for products which need moisture-vapor resistance.

Gardner-Richardson also manufactures a full line of standard grades of boxboard and specially treated boxboards. Sample cartons, made of any of these boards, available, without obligation, for inspection and testing.

Write, today. Outline your problem. Or ask one of our representatives to call.

The GARDNER-RICHARDSON Co.

Manufacturers of Folding Cartons and Boxboard

MIDDLETOWN, OHIO

Sales Representatives in Principal Cities: PHILADELPHIA • CLEVELAND • CHICAGO • ST. LOUIS • NEW YORK • BOSTON • PITTSBURGH • DETROIT

XUM

Silver Anniversary
1920–1945
Jewelry and Novelty Boxes of Distinction



1. Plastic Boxes
2. Transparent Boxes
3. Paper Boxes

Universal Jewelry Case Co.

CHICOPEE, MASSACHUSETTS

New York
Chicago
Philadelphia
Los Angeles
Providence
New Orleans



TAKE OFF from Miami [illegible] Puerto Rico, British Guiana, Brazil — short hop to Ascension Island — two more [illegible] Africa — set-down at Masirah in the Arabian Sea — and then 12,000 miles from Miami and you're half way around the world in India.

The favorite shipping container of the world is the Mason MAILMASTER. Its light weight and rugged construction make it the ideal medium for overseas and domestic shipment.

Consult the Packaging Engineers of The Mason Box Company for your postwar packaging problems.

The MASON BOX COMPANY

ATTLEBORO FALLS, MASS. — 175 5TH AVE., NEW YORK

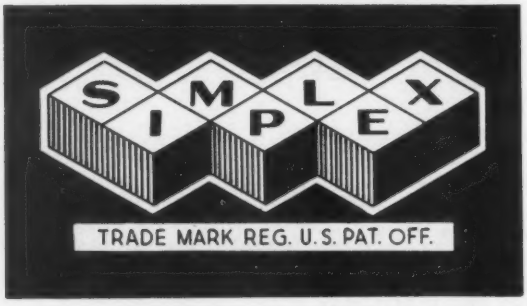
...and Quality!



We specialize in the manufacture of Simplex Boxes



Precision in mechanical production is assured



Quality is a trade-mark guarantee

●

LET US HELP PLAN YOUR POST-WAR PACKAGE

SIMPLEX PAPER BOX CORPORATION
LANCASTER PENNSYLVANIA

IS YOUR POST-WAR PACKAGE UP-TO-DATE ?



Specialists in Packages

FOR

BATH POWDER,
FACE POWDER

Round and Square

ALSO

Small set-up boxes for druggists use for pills, vitamins and related products.

We offer color printing for special boxes.

E. N. ROWELL CO. INC.

Paper Boxes

BATAVIA NEW YORK

XUM



And by "S.A. — we mean sales appeal! In the competitive post-war picture, it will be the package with the most attractive sales appeal that will come out ahead in the long run. Many products are already planned for post-war production. But what about the package?

Why not call in a Berles Carton specialist. You'll find our men creative with the "know-how" to design and produce a carton that is attractive and economical and especially suited to your own needs.

We've been manufacturing special wax-coated protective containers for refrigerated products such as butter, ice cream and frozen foods. Dehydrated, hygroscopic foods for lend-lease are protected with special Berles laminations. We manufacture a great variety of grease proof and moisture proof containers for protective packaging of Doughnuts and other varieties of perishable baked goods.

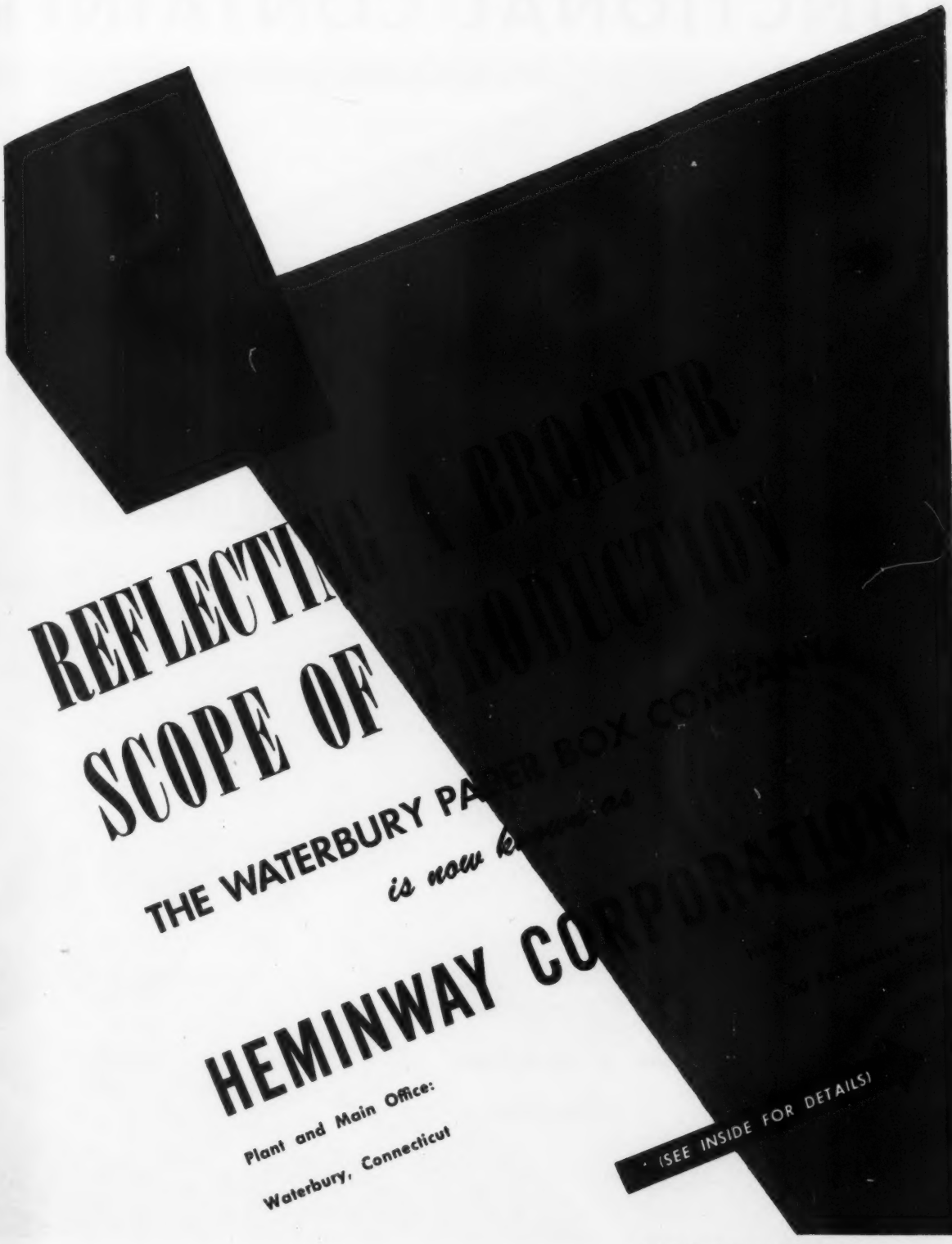
Our transparent cellophane window cartons will make instant self-sellers of your products. Designed of course with Berles creative thinking. We'd welcome a talk with you and would be glad to send samples or suggested designs.

Folding Paper Boxes, Folding Display Boxes, Moisture and grease proof specialties • Waxed Cartons • Transparent Window Cartons for all Food Products, Baked Goods, Drugs, Cosmetics, Dry Goods, Wearing Apparel, Toys, Hardware, Electrical Goods, Notions, Novelties, etc.

BERLES CARTON CO., Inc.

86 FIFTH AVENUE • PATERSON • NEW JERSEY

New York: CHickering 4-3983 • Paterson: SHerwood 2-6430


REFLECTI
SCOPE OF
THE WATERBURY PA
is now k
HEMINWAY CO
Plant and Main Office:
Waterbury, Connecticut
(SEE INSIDE FOR DETAILS)

A WIDE RANGE OF UNIQUE FUNCTIONAL CONTAINERS...





HEMINWAY
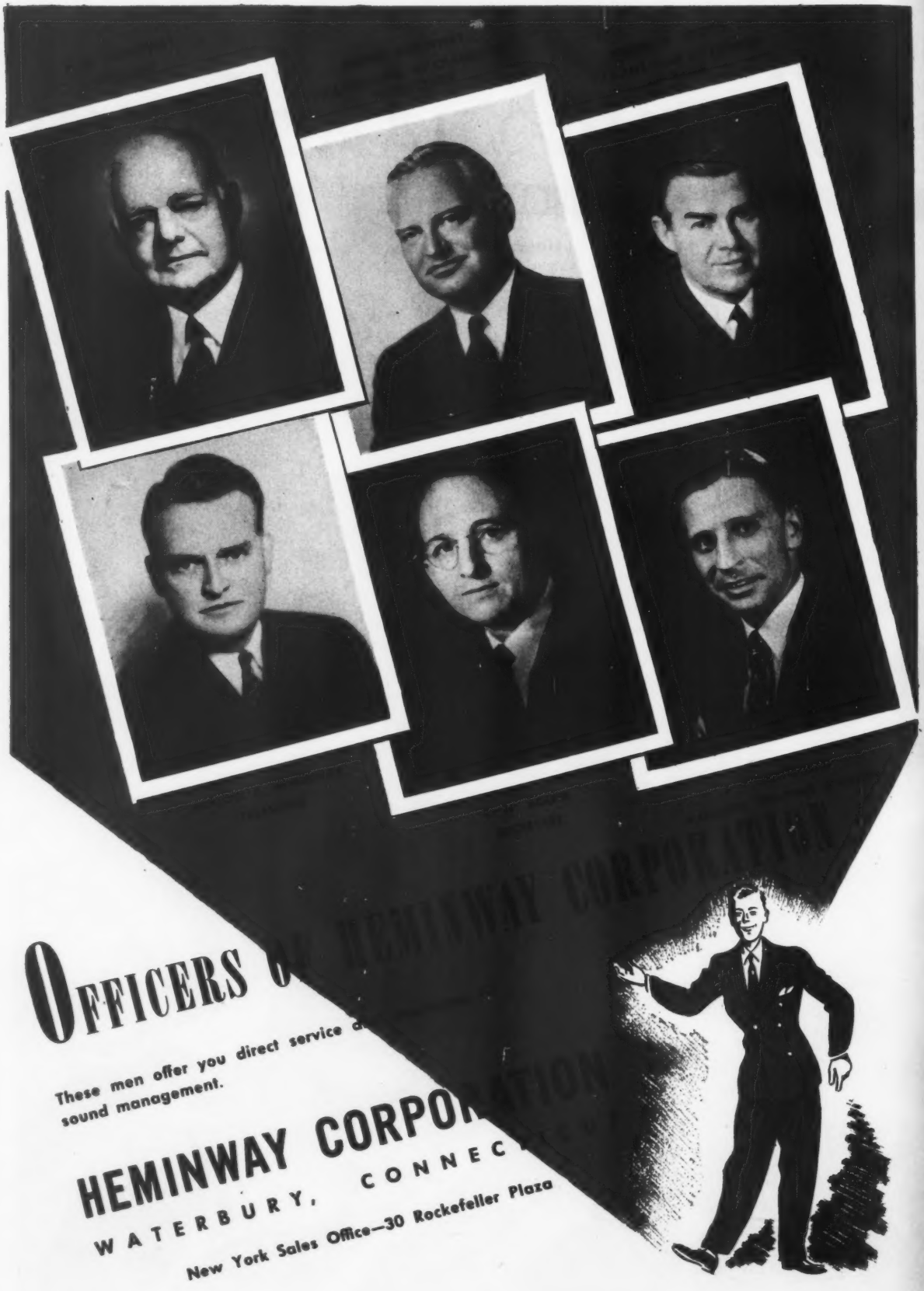
1. Canisters
2. Drawn Products
3. Printing
4. Set-Up Boxes
5. Round Boxes
6. Novelties

PRODUCED BY HEMINWAY CORPORATION

(formerly Waterbury Paper Box Co.)

Our broad manufacturing experience, combined with proved talent for designing unique packages, offers container users a reliable package source. Feel free to call on our organization.




OFFICERS
These men offer you direct service
sound management.
HEMINWAY CORPO
WATERBURY, CONNEC
New York Sales Office—30 Rockefeller Plaza

BOXBOARD AND CARTON MANUFACTURE BY ONE OF THE OLDEST NAMES IN PACKAGING

Fort Orange was one of the first in America to combine the manufacture of boxboard with the production of finished cartons. We offer the following services:

1 Boxboard manufacture
2 Design service
3 Complete artwork and photography
4 Photo engravings
5 Printing of cartons
6 Fabrication of cartons

There are no waste steps or unnecessary transportation. Our plant is located on main freight routes with low rates for delivery by rail and truck to New England, the Mid-West and the Mid-Atlantic states.

First with many innovations in carton production, Fort Orange is still foremost in packaging manufacture.



FORT ORANGE PAPER COMPANY

Castleton on Hudson, N.Y.

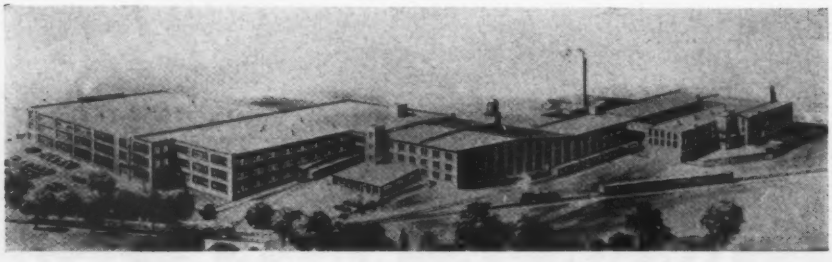
475 FIFTH AVENUE, NEW YORK—SALES OFFICES—STATLER BLDG., BOSTON

XUM

- *Set-up boxes*
- *Folding cartons*
- *Transparent containers*
- *Cigar boxes*

LETTERPRESS Printing and Lithography.

LEPACO Laminated Board, Moisture and Grease Proof Boards, Litho Clay Coated, Flints and other unusual surfaces.



LEBANON PAPER BOX COMPANY

LEBANON PENNSYLVANIA

New York Office, 51 Madison Ave.

TRIUMPHS of TEAMWORK





The homefront, too, is achieving unbelievable results thru complete coordination.

Here is the consumation of a packaging triumph thru teamwork between a food manufacturer, his art advisors, and his carton supplier. Full credit cannot be taken by any of these three units . . . yet the final results achieved would not have been possible were any of these three to have failed in their respective responsibilities.

R. T. G. is proud of its part in doing this particular job for the home front. It exemplifies what it will do many times over during the post-war period.

Remember, the lowest priced carton supplier is not always the cheapest! For the ultimate value is the embodiment of appearance and workability of the carton, plus the creative resources of the carton supplier.

rtg

THE RICHARDSON · TAYLOR · GLOBE CORPORATION

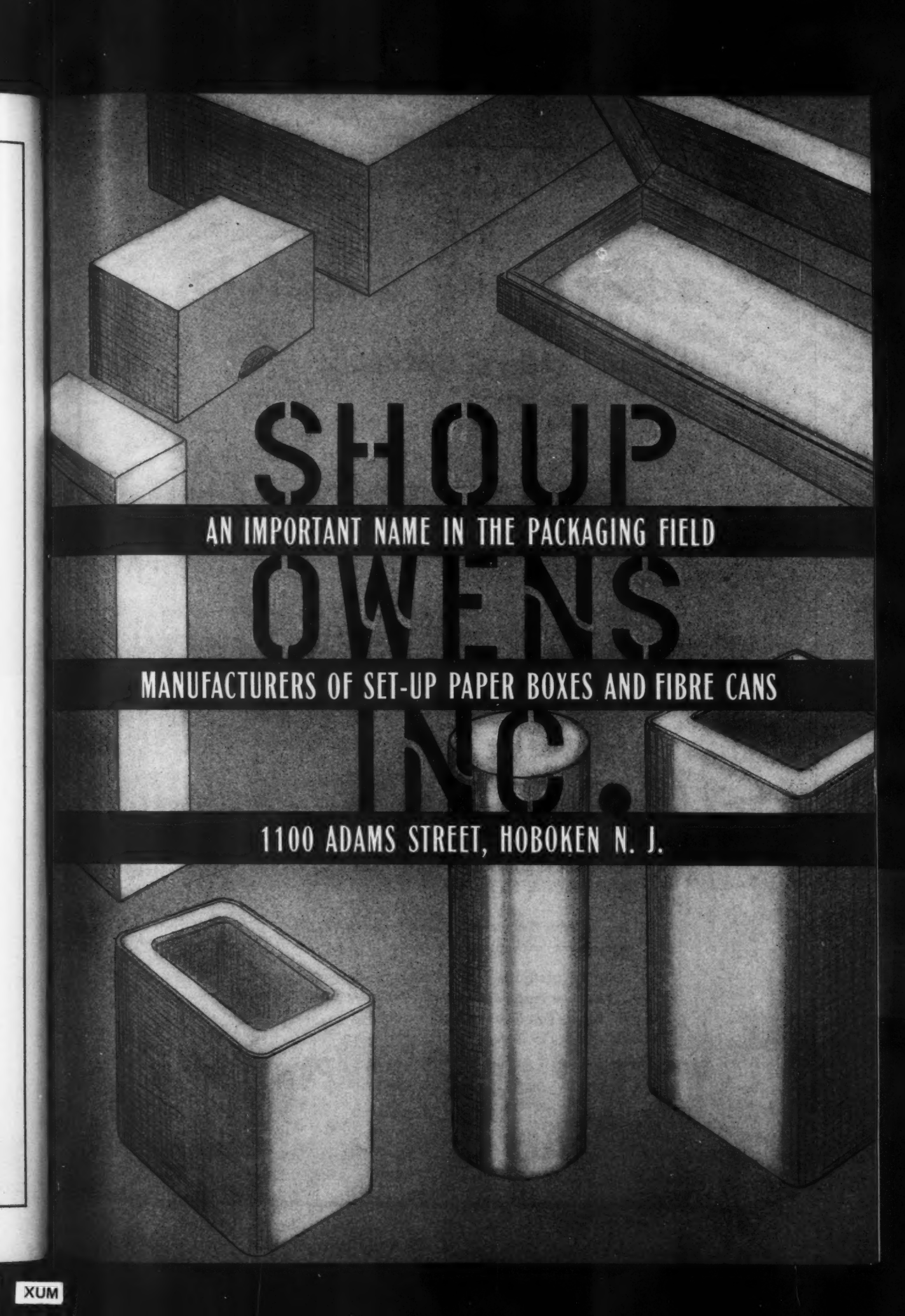
4501 WEST MITCHELL AVENUE · CINCINNATI · OHIO

BUTTERFIELD-BARRY

The Oldest name in Box Board

For 92 years we have specialized in the better grades of boxboard for the Set-up Box industry and the Folding Box industry. Many of America's finest products are packaged in Butterfield-Barry boards. Among our well-known specialties are ROYAL SATIN—the highest grade set-up boxboard—and TREDONIA lined board, for moisture and grease-proof packaging.

THE BUTTERFIELD-BARRY COMPANY
INCORPORATED
174-178 Hudson Street **New York 13, N. Y.**


SHOUP
AN IMPORTANT NAME IN THE PACKAGING FIELD
OWENS
MANUFACTURERS OF SET-UP PAPER BOXES AND FIBRE CANS
INC.
1100 ADAMS STREET, HOBOKEN N. J.

XUM

"Write us a piece of copy that

doesn't say anything too definite"

we told our advertising manager. But we think he came up with something worth reading . . .

Today everybody has questions and wants answers. And the only answers we can give are answers that ask more questions.

Making set-up paper boxes is still our business, but hardly our own *business. OPA, WPB, WLB, WMC . . . you know what we mean. We're not criticising or complaining, we're only explaining why we can't possibly write an ad on box production that will apply throughout 1945.*

Note: We said production.

But the actual *making* of paper boxes is only part of our service. We like to begin far in advance of production—with planning, creating, designing, the headwork that precedes the handwork. So we're not at a loss for words! Because we're certainly not at a loss for ideas.

Boxes? Sure. But we like to consider ourselves creative *boxmakers, with* plans *as well as a* plant *to offer.*

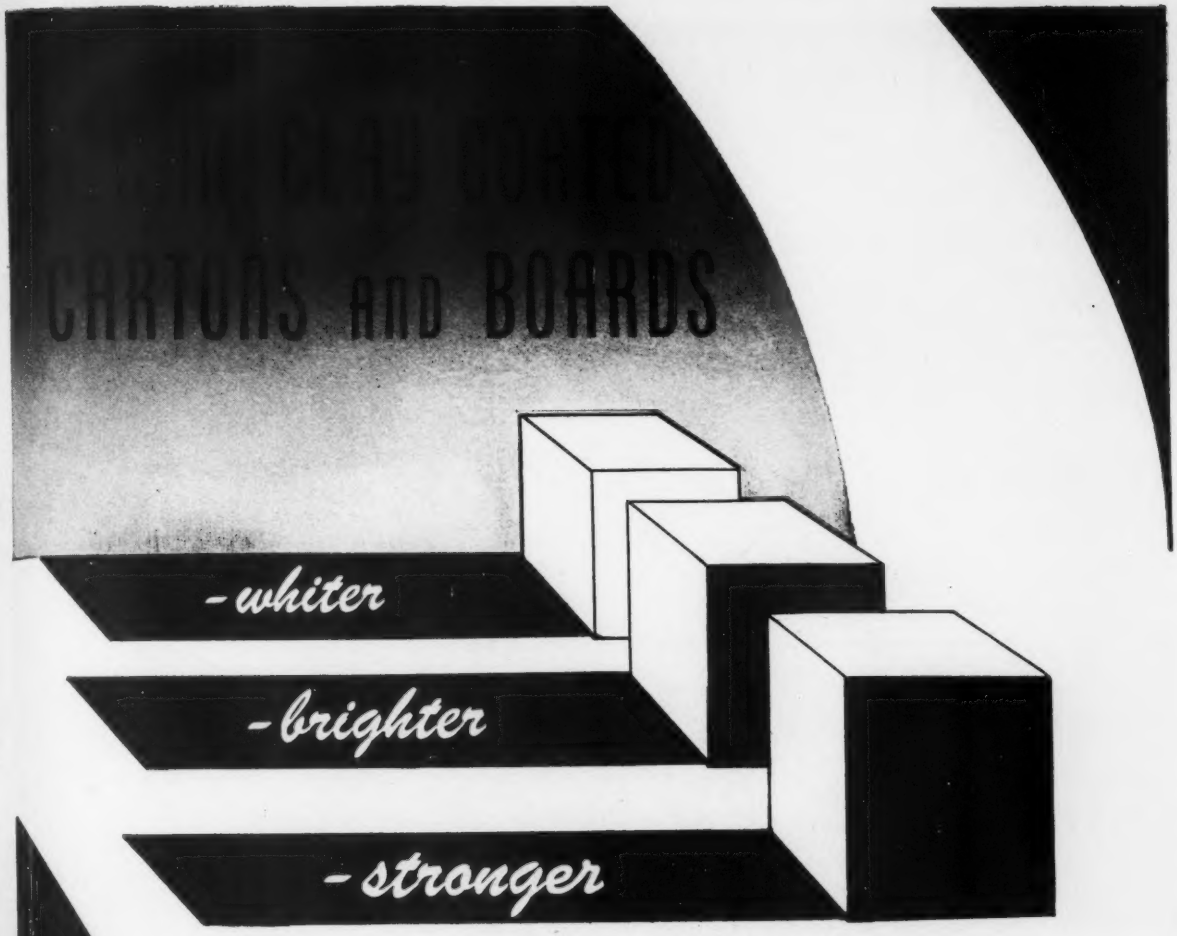
And for planning *we are always at your service. Production may have to wait. But a big part of your packaging can be done* right now.

WALTER P. MILLER COMPANY, inc.

452 YORK AVENUE
PHILADELPHIA



Paper Boxes



A.C.M. clay coated cartons and boards are recognized as the highest standard of quality. Why?—because A.C.M. clay coated is whiter, brighter and more rigid. It has a finer surface for printing and dirt resistance.

A.C.M. use only the best raw materials and the best quality of coating and the product is manufactured to suit the finished carton — a real "custom built" job

When you ask for clay coated — make sure it is **A.C.M.**

AMERICAN COATING MILLS INC.

MAIN OFFICE – ELKHART, INDIANA

Paper Mills & Folding Carton Plants – Elkhart, Indiana • Chicago, Illinois

Branch Offices – 271 Madison Avenue, New York City • Wrigley Building, Chicago, Illinois

XUM



TOMORROW'S BOXES?

We do not know what new materials will be available for trim or styling on tomorrow's containers—but, we intend to continue with the manufacture of fancy wooden boxes, and will use the most appropriate materials available to combine with the natural beauty of wood.

PETERSON BROTHERS

165 NORTH ELIZABETH STREET • CHICAGO 7, ILLINOIS

Fancy Wooden Boxes

FOLDING CARTONS *and* DISPLAYS

ART
CONSTRUCTION • COPY
COMPOSITION • DIES
PRINTING • LITHOGRAPHY
DIE CUTTING • STRIPPING
GLUEING • BRONZING
CELLOPHANE WINDOW BOXES

CREATED TO MEET YOUR NEEDS

Years of painstaking endeavor and enterprise have combined to build these departments to serve you.

BROOKS & PORTER, INC.
304 HUDSON STREET . . NEW YORK

XUM

Sales Promotion in WOOD



Fine wood boxes by Pilliod add sales appeal to the products they display, be they large or small. And more than that, they provide customer satisfaction for years to come. Let *your* post-war packages be made of wood, designed by master craftsmen to heighten product acceptance and increase product serviceability. Your product will be at its best in a rich wood box . . .



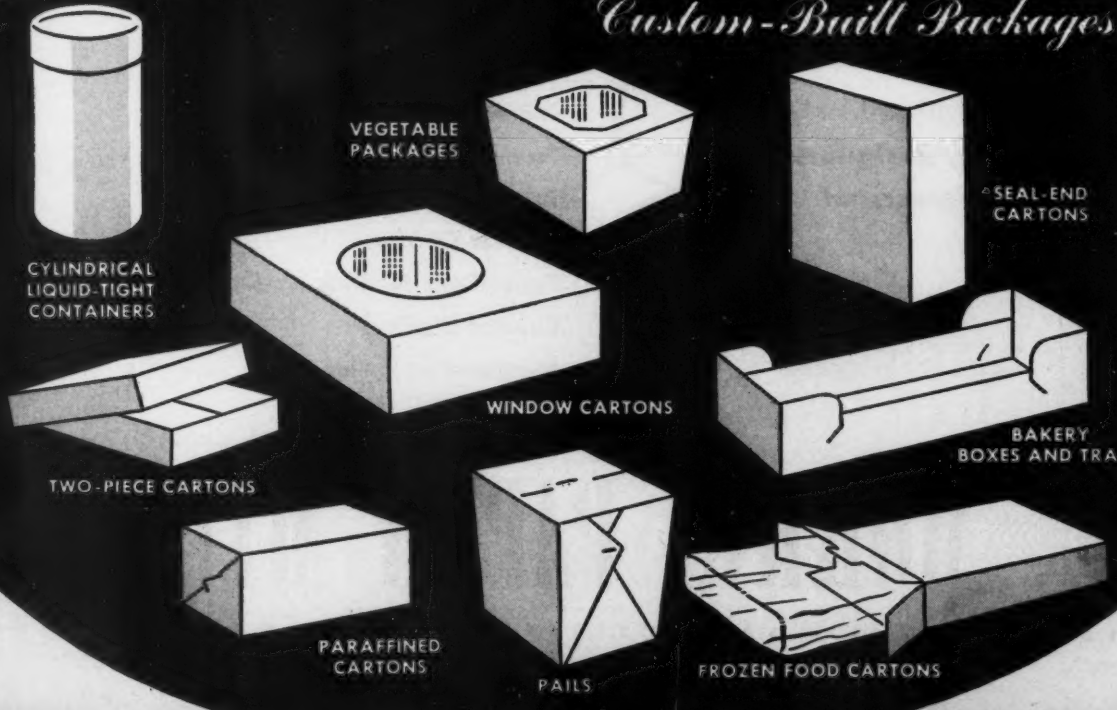
DESIGNED BY THE **PILLIOD** CABINET COMPANY · SWANTON, OHIO

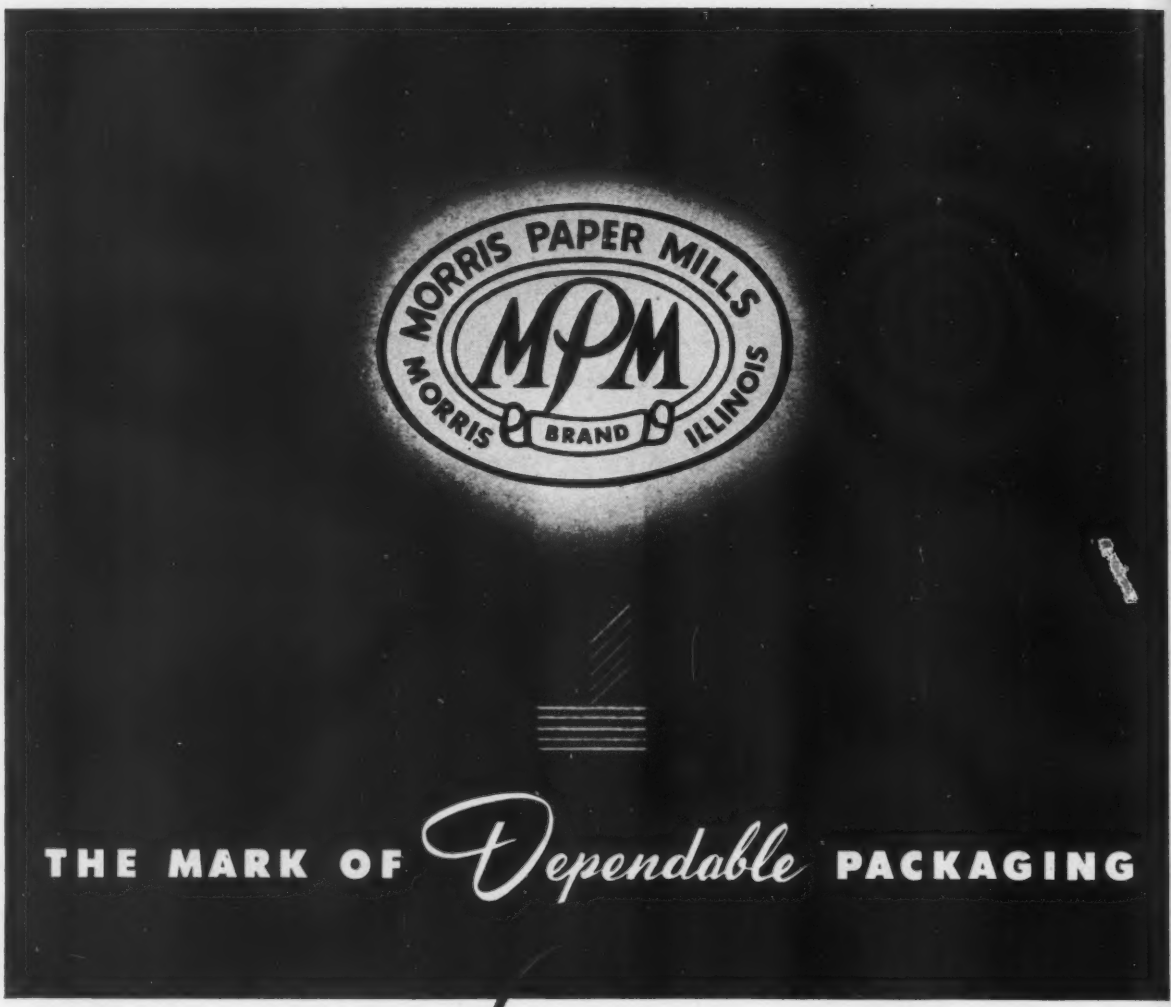
Whatever Package Your Product Needs

SUT[illegible]CO.

SUTHERLAND PAPER CO. KALAMAZOO MICH.

All Styles of Custom-Built Packages



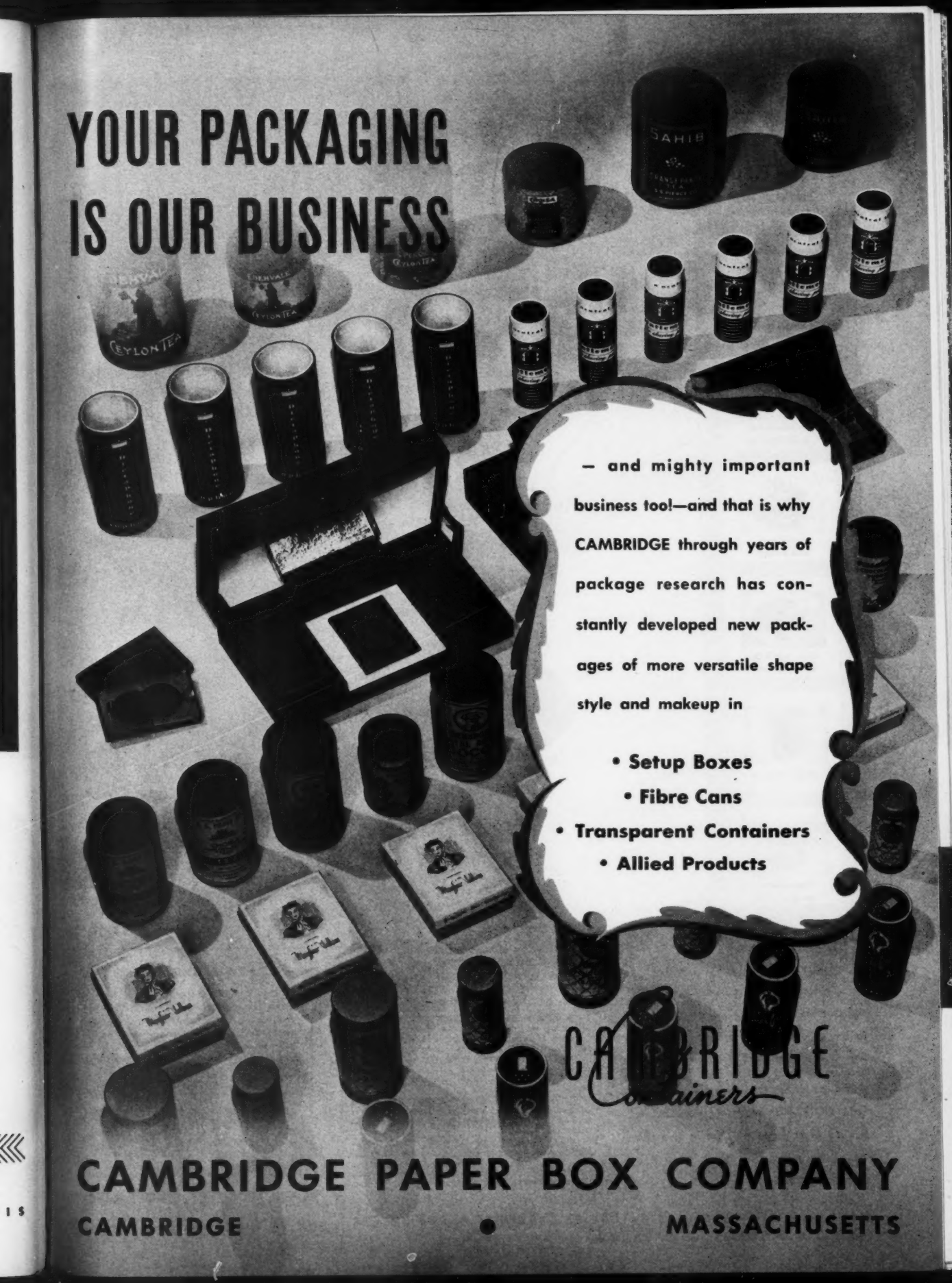


creators, designers and manufacturers of

- Folding Cartons
- Garment Boxes
- Millinery Boxes
- Frame-View Display Boxes
- Beverage Carriers
- Cracker Caddies
- Paper Cans for Bulk Ice Cream
- Counter Displays
- Merchandising Aids

MORRIS PAPER MILLS

135 SOUTH LA SALLE STREET • CHICAGO 3, ILLINOIS


YOUR PACKAGING
IS OUR BUSINESS
SAHIB
CEYLON TEA
— and mighty important business too!—and that is why CAMBRIDGE through years of package research has constantly developed new packages of more versatile shape style and makeup in
• Setup Boxes
• Fibre Cans
• Transparent Containers
• Allied Products
CAMBRIDGE
Containers
CAMBRIDGE PAPER BOX COMPANY
CAMBRIDGE • MASSACHUSETTS

APPLICATIONS OF ROGERS PRODUCTS


Resin-fiber blank for machete handle


Loose-leaf binder back


Rubber-fiber shoe midsole


Jewel box components


Elec. insulator for transformer


Waste basket


Resin-fiber canteen cap

HE'S USING A ROGERS PRODUCT



THIS shows a use for a ROGERS product which is the result of deft blending of rubber and pure cellulose fibers, making a sheet that is easily cut into midsoles, perhaps for the shoes you're wearing now.

If you knew the characteristics of this ROGERS product, you might decide that here at last is the material for a special part of one of your own products.

You may already use a ROGERS product every time you take a step. And you might profit by making your next business step a letter, wire, or phone call for:

☐ SAMPLES OF FABRICATED PARTS, some of which are shown above, left. Extensive tool and die facilities and testing laboratories in ROGERS' own mills.

☐ DATA ON THE UNIQUE mechanical, electrical and chemical characteristics of ROGERS wet-laminated, fibrous sheet materials.

☐ DETAILS OF THE ROGERS PROCESS of wet laminating so that fibers stay interlocked after fabrication, giving components unusual strength.

☐ INFORMATION ABOUT THE ROGERS method of producing with only 25 lbs. of materials, production samples of totally new fibrous and plastic sheets. "You name it, we'll make it."

RUBBER-FIBER MIDSOLES

Three weeks after hearing of the need for this material, ROGERS was producing it in completely satisfactory carload lots. This same speed and skill can be applied to your own special problems, through ROGERS exclusive "production sample" facilities.

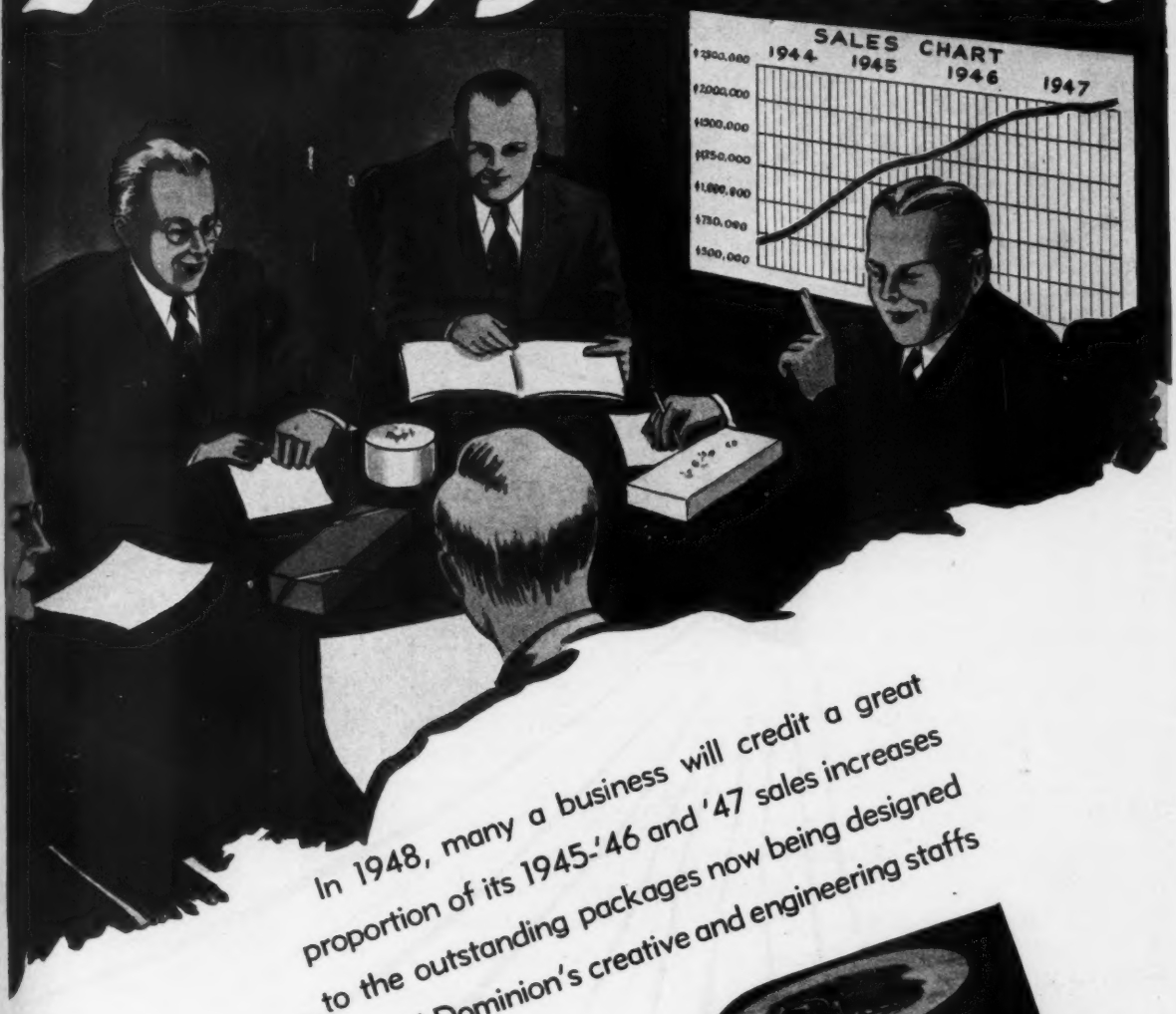
ROGERS

PAPER MANUFACTURING COMPANY

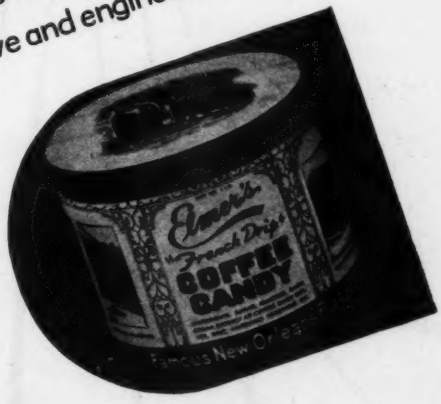
111 Mill Street, Manchester, Connecticut

MANUFACTURERS AND FABRICATORS OF SPECIAL FIBROUS SHEETS

Looking Backwards



In 1948, many a business will credit a great proportion of its 1945-'46 and '47 sales increases to the outstanding packages now being designed by Old Dominion's creative and engineering staffs



Call On

OLD DOMINION BOX COMPANY

CHARLOTTE, NORTH CAROLINA

PLANTS IN NINE SOUTHERN CITIES

Folding Cartons • Set-Up Boxes • Convolute • Spiral Wound and Corrugated Containers

"THE SOUTHERN BOXMAKER WITH A NATIONAL REPUTATION"

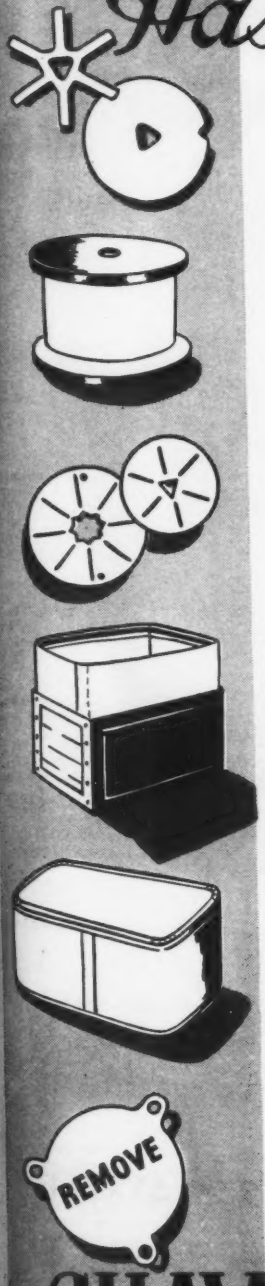
New York Representatives, BAKER PRESS, 228 East 45th St., New York 17, N. Y., Murray Hill 2-6492

There is no finer cosmetic container than a Karl Voss box



HOBOKEN . KARL VOSS CORPORATION . NEW JERSEY

War Time Packaging Has Taught Us a Lot



Yes, protective packaging for war products has taught us a lot – some by research and design, and some by bitter experience. We've learned that die cut inserts can hold many delicate products firm in shipment. We've learned that paper and paperboard contain many properties never before realized, that they can replace fabrics and metal as component parts in manufactured products. We've learned how synthetic base plastics can protect bomber engines from the ravages of moisture and salt air.

These and many other results have been obtained through die cutting. Paper, paperboard, and plastics intelligently die cut for a purpose have solved many problems during this war, and we would like to help you with your problems. From the thinnest of papers up to 125 point paperboard we have successfully die cut intricate shapes and forms to accurate dimensions. Why not call on us for your die cutting requirements?

We, at Shaw-Randall, also operate a large division making waterproof case liners. Are you having difficulty obtaining them? Call on us for prompt delivery.

SHAW-RANDALL COMPANY

PAWTUCKET, RHODE ISLAND

★ ★ ★ ★

31 YEARS OF SERVICE



FOLDING BOXES

DISPLAY CONTAINERS

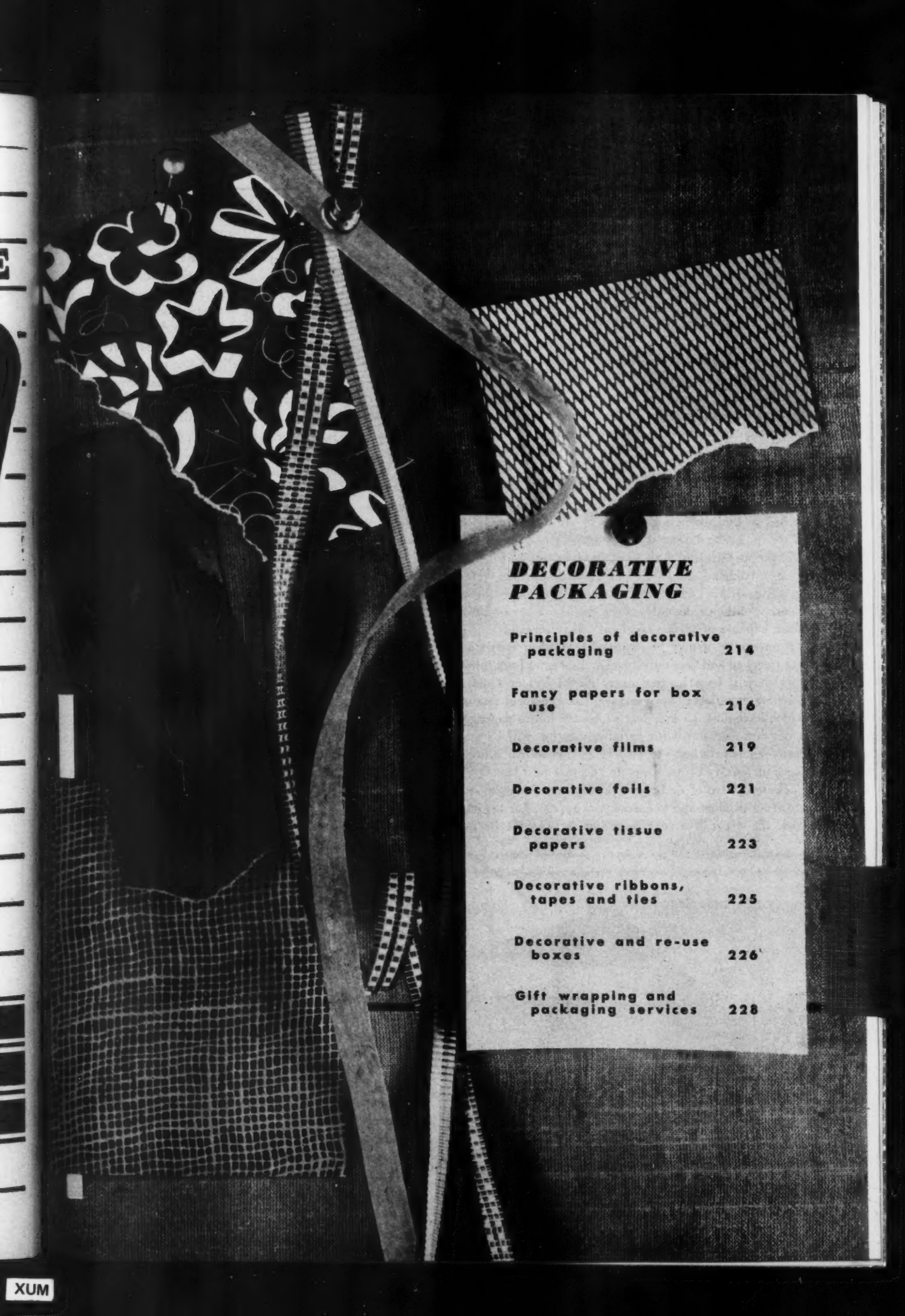
"Designed to Sell on Sight"

We will solve your post-war packaging problems by applying the knowledge and ability acquired by us through the years. Our outstanding creative designs assure successful merchandising.

ACME

FOLDING BOX CO., INC.

ESTABLISHED 1914



DECORATIVE PACKAGING

Principles of decorative packaging 214

Fancy papers for box use 216

Decorative films 219

Decorative foils 221

Decorative tissue papers 223

Decorative ribbons, tapes and ties 225

Decorative and re-use boxes 226

Gift wrapping and packaging services 228

XUM

Principles of decorative packaging

A perusal of journals like MODERN PACKAGING for the past three or four years would offer pretty convincing evidence that decorative packaging has been on a long leave of absence. Technical and utilitarian considerations have received major attention. That is exactly as it should be. If a considerable portion of the world goes so woefully off the beam as to make all beauty go into temporary seclusion, packaging must don its overalls too until sanity is restored.

The transition was not without its compensations. Just as many a society beauty, whose only thoughts were of adornment and pleasure, discovered a field of useful service in war work, so decorative packaging materials and techniques were found to have real utility. For example, set-up boxes have always been regarded as the type of package which has been especially and almost exclusively suited to the packaging of de luxe products (see *Set-up Boxes* p. 149 and *Special Types of Set-up Boxes*, p. 159). But the war pressed these packages into service for precision instruments, for blood plasma, for ammunition. The qualities which made for successful packages in the luxury field needed only slight modifications to render them capable of giving excellent utility service.

Conversely, it may be expected that when restrictions are removed and decorative packaging comes back into its own, it will have learned many useful lessons from its wartime experience. For instance, the structural features which have done an excellent protective job in packaging a delicate instrument for aerial navigation will be modified—and beautified—to protect and embellish a lovely piece of jewelry or an exquisite and rare perfume.

The objective of decorative packaging, of course, is to glorify a product and to enhance its appeal. For the most part, the decorative treatment may be seen at its best in connection with luxury products—cosmetics, confectionery, fancy bakery products, rare fruits, exotic flowers, jewelry and gift packages. Sometimes the results are atrocious artistically and wasteful from an economic point of view—which leads to the observation, in passing, that there are those who condemn all packaging as deceptive and misleading. Their position, carried to its logical conclusion, would require all packaging to be severely plain with no place for adornment, on the ground that a beautiful package exerts an undue influence on the buyer, who should buy on the basis of cold specifications.

1—Even military needs call for decorative packaging—soldiers' medals are encased in handsome jewelry boxes. Photo, Arrow Manufacturing Co.

1



The truth is, of course, that though there are exceptional abuses, most decorative packaging is in harmony with the products packaged and in line with the desires of the consumer. Otherwise it could not exist. Time was when only the favored few could enjoy luxurious products, decoratively packaged. But mass production methods have spread these benefits and brought beauty to everyday life.

The materials of decorative packaging are many and varied. In fact, almost any packaging material can be treated decoratively. The fancy package may make use of several materials. The following list presents some but by no means all of the possible materials:

Boxboard—coated; metalized
Paper for box covering—embossed; imitation leather, fabric, or wood veneer; crepe; tissue; glazed
Custom-designed box wraps
Glass containers—hand blown or special molds
Novelty closures of glass, ceramics, wood, metal or plastics
Ceramic containers
Wood bowls and boxes
Metals—principally aluminum, copper, bronze
Metal foils
Ribbons, tapes and ties
Fancy printed string
Fabrics
Plastics—molded, extruded or cast—of many kinds and colors with an infinite variety of possible shapes
Transparent plastic sheeting
Coatings—for both protective and decorative effects

Various marking methods and graphic arts processes are also at the service of the decorative package, with all of their many possibilities in color printing. These materials and processes are discussed more at length elsewhere in this book. The purpose of the foregoing list is merely to present a quick review, to suggest the wide scope open to the decorative packager.

Perhaps the first and most important principle to be observed in decorative packaging in this: the package must be appropriate for the product and its market. Here—as is almost invariably the case in planning any kind of package—the problem should be approached from the standpoint of the ultimate consumer. The experienced



2

2—*This line of cosmetics uses many materials for packaging—ceramic closures on glass bottles, labels of metalized paper, lithographed and embossed; set-up boxes; fancy ribbons and ties. Photo, Swindell Bros.*



3

3—*Good practice in packaging fancy fruits and confections is to let the product speak for its appetizing self. Here transparent materials are used to good advantage for both protective and decorative effects.*

merchandiser knows full well that class lines are pretty sharply drawn when it comes to consumer acceptance. For instance, a lurid label and a flamboyant package will make a sure fire hit with certain levels of society in the promotion of such products as wines and liquors; whereas severe simplicity and dignity of line and design must be adopted to appeal to other levels. Hence the starting point should be a pretty clear cut idea of one's potential customers.

This includes, of course, a knowledge of the outlets through which the products are distributed. It will not do to answer this question, for instance, by merely saying "Department stores," but one must know just exactly what kind of department stores.

The principle of appropriateness covers the element of cost as well. There is, of course, no standardized percentage for package cost in any line of business, let alone the fields where decorative packaging belongs. It might be concluded that since the decoratively packaged product represents only an occasional purchase, it therefore is possible to "get away with murder" by expecting an elaborate package to make up for product deficiencies. Indeed, that is one of the gripes of the consumer agitator against all packaging. It doesn't take more than a moment's thought to convince anyone that that is a short-sighted policy; that it is more profitable in the long run to keep package cost within due bounds.

The firm that goes in for decorative packaging of its products usually finds itself committed to a policy of frequent package changes. This has both its good and bad points. Among the advantages is that if one does "pull a boner" it's not irrevocable; it can be remedied quickly. On the positive side, however, it means constant freshness and variety—something which the American public loves, particularly in connection with luxury items and occasional purchases. To take fullest advantage of this public preference means that package development must become a major executive responsibility under the direction of a supervisor who can make sure that all angles are considered before a package is adopted.

A point to be noted is that decorative packaging, because of its use of so many kinds of materials, very frequently entails the need for hand or semi-automatic packaging operations, particularly if changes are made periodically. These operations of course are more costly per unit of product than fully mechanized production is, but that is a condition which the packager must face in deciding whether the results warrant the expense.

Above all, the cardinal rule is to follow the dictates of good taste. Adherence to that principle will probably solve many problems of economics as well as protection and appeal. The ancient Greeks had a saying: "We Athenians love art with cheapness." Their work still stacks up pretty well.

XUM

Fancy papers for box use

In the fancy paper industry, design means everything. In normal times, success or failure of a line of products or a complete line of papers depends upon how well the manufacturer of the boxed merchandise, the box maker and the fancy paper converter have been able to forecast popular taste in design and colors.

Today, however, practically anything will sell, because there is so little fancy paper to supply civilian demand. Surplus stocks of designs unpopular in normal times have been cleaned out. Due to difficult supply and labor conditions, converters since the beginning of the war have had to concentrate on a few standard leaders. There has been very little time for change-over in production from one pattern to the other. There has been precious little metal for metallic printing. Users have had limited selections.

Converters report that they are running only 50 to 60 per cent of normal production of fancy papers. They have not been restricted by government order in the quantity they produce, but their output is limited to the tonnage of paper that can be supplied to them by the mills. Pulp is rationed to the mills and the amount the mills can divert to civilian usage must therefore be voluntarily rationed among the various converters. Usually the amount of paper a converter receives today is determined more or less on a friendship basis with the mills where he normally does business.

The fact that some converters are engaged up to 85 per cent in war work also effects the supply of fancy papers available for civilian orders.

While the machinery rolls on war orders, however, the converters are already thinking of postwar lines. Tucked away in desks are new designs waiting for the day when they may be put into production. In warehouses are embossing rolls held for the time when paper supplies are plentiful. These paper men lend an ear to any word about design trends. They are eager for suggestions from designers. As in other industries, they too are more alert than ever to methods for measuring consumer preferences. Much of their past planning has been in the dark, they say, because of their remoteness from the end usage of their products. The converter sells to the box maker. Oftentimes he does not know on what type of boxes the box maker plans to use the paper. Closer cooperation with box makers and users of the boxes will bring designs more quickly styled to changing tastes and fancy paper makers are working to that end.

There is an excellent opportunity for the designer in this postwar program to develop completely original designs integral to paper and paper processing in contrast to past practice. Established embossing designs, for example, are most usually simulations of fabrics such as linen, herring-bone tweeds, silk brocade, laces, basket weaves—or leathers, such as pin seal, alligator or ostrich. Oftentimes, printed designs are wood grain reproductions or florals patterned after cretonnes. Such designs are many times actual reproduction of fabrics. Paper men constantly cover the textile markets to find new fabrics for such reproduction in keeping with fashion trends. Many of these are beautiful designs and will continue forever. One paper man can point to an embossed leather pattern that his company has been producing for more than 70 years. Off and on it returns to popular demand. Throughout swatch catalogs one might find hundreds of designs that are good year in, year out.

Nevertheless, there is constantly a desire for something new. The fancy paper industry points to the modernistic



1

1—Leading standard patterns showing florals, wood grain, feathers and geometric designs that have been continued for box use throughout the war. Swatches, Hazen Paper Co., The Marvellum Co., Nashua Gummed & Coated Paper Co.

or geometric design influence that characterized the late twenties and early thirties. They are trying to forecast what the next will be. To date, nothing so pronounced has replaced this vogue.

One paper company revealed a paper design based on forms portraying light refractions through glass and another symbolizing the graph lines translated from electronic impulses of radar waves. These designs have a timely theme, but how they will be received by the buying public this company does not know. It is willing to take a gamble, when the patterns are worked out to its own satisfaction.

Some of the fancy paper companies are making excellent protective papers with greaseproof and moisture-vaporproof qualities for ordnance wraps and other overseas shipments. Many of these offer the user a completely new type of packaging paper. Some of these may be combined with decorative printed or embossed effects to provide eye appeal. So far, however, the companies have been too busy with war orders to experiment.

Leading consumers of fancy box papers are stationery, candy, cosmetic, and jewelry manufacturers and distributors. Another big field is gift boxing of all kinds. Of all these, the manufacturers of boxed stationery and papetries are said to be outstanding in the determination of style trends. Tons of papers are used for this purpose every year as box coverings and box linings. The designs selected are watched avidly by the fancy paper and box making industries because of the influence on boxes for other lines of merchandise.

Just before the war, competitive merchandising placed increased emphasis on the value of trademark and brand identity. Many companies had their own trademarked papers. Fancy paper manufacturers believe there will be more of these after the war. The prospective users, however, should know that trademarked papers are feasible only for the packer who can use upwards of 1000 reams (approximately 26,000 lb. of average weight box paper) before the cost of art work, engraving and other specialized production costs are covered.

Most fancy paper makers have printing facilities and embossing rollers for producing several hundred different designs. In normal times they introduce 8—12 new printed patterns in various colors and 4 or 5 new embossing patterns a year. Old designs are kept, many revived again and again at five to ten year intervals; others are inactive unless a particular order is requested.

Once the pulp situation clears, all of these designs and many new ones will be ready for resumption of the decorative packaging that is such an important aid to modern merchandising. Any of the fancy paper stocks and methods of producing them listed below are possible, but the user should select them with care—based on accurate measurements of consumer preferences, the character of his market, the quantity he requires, the cost factors, etc., as well as watch the little details, such as deciding whether he wants to pay for the extra handling to match striped patterns on boxes, or avoiding colors and surfaces that are easily soiled or damaged, etc.

Types of box covering stocks

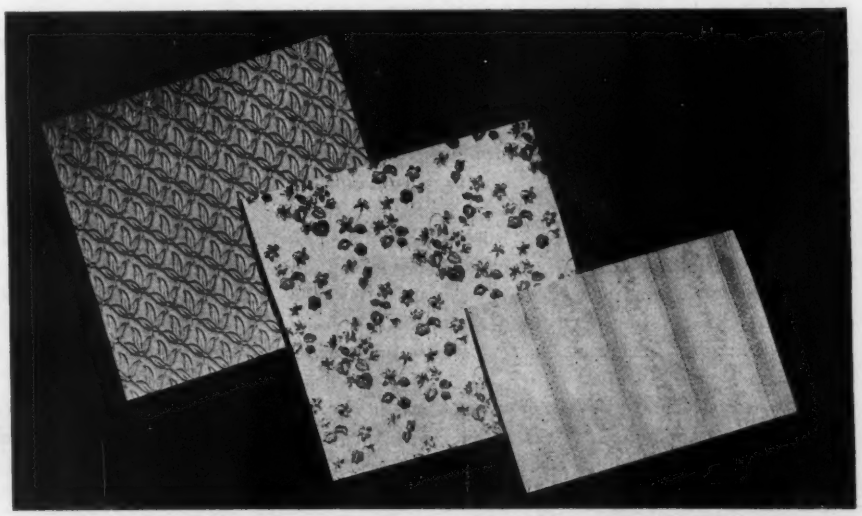
The following list includes practically all standard kinds of stocks used for fancy box covering available in normal times.

Uncoated box papers—The kind of paper, such as rag, sulphite, kraft, or groundwood, which is to be coated, embossed, etc. This may be antique, natural finish, or super-calendered.

Coated box papers—Prepared by several processes, as follows:

1. Matte coated: A casein- or clay-coated paper made on brush coater or roll coater, or some type of brushless coating machine.
2. Brush finished: A coated paper whose surface is polished by brushes.
3. Plate: A coated paper, finished smooth by cold rolls through pressure in a stack calendering machine. For a very high finish this paper is sometimes subjected to steam before being calendered.
4. Friction glazed: A coated paper whose surface is polished by heated rolls in a friction calender, friction being produced by the faster rotary action of

2



2—Popular embossed vellet and floral stripe patterns that are reordered again and again. Stripes are more difficult to handle, due to necessity of accurate placement of stripes on the boxes. Swatches, Hampden Glazed Paper & Card Co.

the steel polishing roll against the slower cotton roll.

5. Mica: Paper whose coating material consists of ground mica crystals to give it a sparkling, finished appearance.
6. Flint: A coated paper whose surface is highly polished by being rubbed across the sheet with flint stones. This process is slow but effective.
7. Waterproof: A paper coated and then top-surfaced with waterproof material, such as casein or gums; or coated once with heavily sized color; or mixed with waterproofing gums.
8. Waterproof lacquers: Coated papers using pigmented pyroxylin lacquers, which produce an unmottled surface with antique or high-gloss finish.
9. Flock: Paper coated with varnish on the surface of which is shaken or blown finely powdered cotton, wool, rayon or silk; commonly known as *velours*.

Metallics still under restriction

Real and simulated metallic effects on all coated papers produced as follows:

Gold, platinum, tints—Produced by grinding bronze (gold), aluminum (silver) and copper, with casein and other gums or with pyroxylin lacquer; paper generally stack calendered to produce smooth and brilliant appearance.

Silver, glazed (silver coated)—Paper coated with "argentine," a precipitate of tin, which is first dull gray in color, but is polished to a silver finish by a friction calender. "Argentine" finish is now also available in gold and colors, both plain and embossed.

Pyroxylin coated—with lacquers in bright, dull, and pearly irridescent effects.

Half fine metallics—Produced by laying patches of a thin copper or aluminum alloy about five inches square on paper that has been coated with an adhesive. The patches are allowed to overlap in order to form a continuous metallic surface and the overlapping edges are brushed to remove any surplus.

Foils—Produced by applying to paper a continuous sheet of metallic foil, usually tin, aluminum, zinc, or their alloys. The foil is bonded to the paper by adhesive.

Printing

Fancy box-covering papers are either embossed and tipped with colored or metallic ink, or printed in designs of one or more colors. They may be decorated in mottled, speckled, streaked or blended effects, or in a definite design by any of several processes, such as wall paper or other rotary printing machines, intaglio printing, print or ink embossing or topping.

Kidder—Oil-ink surface printing from curved plates locked on a roller form and registering each impression as the paper runs beneath.

Wall paper—Water-color surface printing in one or more colors from relief-pattern rollers, one for each color, registered to make the complete design.

Aniline—Stained or printed or both, with rubber rollers and relief-cut patterns—generally with alcohol-gum colors.

Intaglio or rotogravure—Papers printed from a pattern engraved on a copper roller by the photogravure process or by the use of a pattern mill. The ink, which may be water color, aniline, oil, or lacquer, is wiped off the roller by a thin blade set across it which controls the amount of ink by the angle of the blade and the depth of the engraving.

Embossing methods

By an embossed paper is understood any type having a pattern in relief, produced by any of these processes:

Regular—A steel pattern roller and a wet paper-matrix roller are mated together.

Friction embossed—The pattern is pressed against a smooth paper roller run without gears, which permits a slight friction as it makes contact with the pattern. Friction is produced by the use of cold and hot pattern rollers, the latter being bored and piped for steam heating. The combination of pressure and friction causes a deepening of color in the area of the pattern.

Print embossed—Embossing and printing in one operation by the application of ink to the embossing pattern.

Topped and embossed—A two-toned decoration made by applying color through a roller to the surface of the embossing.

Spanished—Color applied to the entire surface of a sheet and then scraped off with a blade, which leaves varied tones of the decorating color depending on the varied depth of the embossed surface.

Embossing designs

Common—Patterns in common use by manufacturers of embossed paper. For instance: Skytogen and certain leather-grains, moire, basket weave, Persian lamb and swirl designs.

Exclusive—There are several hundred different embossing designs which have been originated or purchased by individual manufacturers who thereby own these designs exclusively. Most manufacturers have exclusive designs of their own and many such designs are protected by registration at the United States Patent Office. The Glazed and Fancy Paper Manufacturers' Association, 902 Union Trust Bldg., Providence, R. I., maintains a registration bureau of these designs for the protection of its members and to answer inquiries from customers and users.

Descriptive terms

The following descriptive terms are commonly connected with box papers, their sales value, or qualities:

Fabric designs—Papers printed in designs that imitate various fabrics, commonly known as "fabric prints;" or embossed in imitation of fabrics, such as rep, linen, burlap, and others.

Leather-grain—Papers with designs like grains in leather produced by embossing, ink embossing, spanishing, printing, or coating. Common examples are alligator, seal, walrus, caracul, etc.

Decorative films

by J. M. Cowan

Because any transparent film is sparkling, eye catching and inherently decorative, this article will cover the more unusual and ingenious film applications and ideas which result in outstanding beauty and interest rather than limit itself to the discussion of films themselves which have been specially processed by the manufacturer to achieve a different appearance. In the latter group are embossed effects and colored films. Their volume of sale, even for holiday packaging is relatively small as compared to the transparent types which may have been printed or otherwise processed to tell consumers, "It's a gift." Even when colored film is used for gift packaging, it is often printed or fabricated into ribbons or holiday bands or other forms for greater appeal and utility.

A distinction should also be made between a standard year-round seller which is to be given a gift atmosphere for a particular period and typical gift merchandise which depends largely on gift buying throughout the year such as candy, cosmetics and flowers.

Uses of cellophane

The most widely available transparent film is cellophane viscose film. It is also the least expensive and is probably converted and fabricated in more different forms by processors than any other. Future film developments may change this picture but most authorities agree that viscose film will continue to command a substantial part of the decorative packaging market.

Cellophane viscose film may be printed by aniline, letterpress and gravure process. The printing may be applied either on the surface or on the under side of the sheet. In the latter case, the design is viewed through the film. This technique imparts high lustre to the area which is printed.

Drinking straws made of cellophane viscose offer marked decorative possibilities. The material may be flocked or pleated or laminated for certain uses although cellulose acetate is generally preferred because of its dimensional stability.

Cellophane is made up in bags and envelopes, printed or plain, and may be shredded for nesting choice fruits or fragile pottery gift units in larger containers.

Ribbons of cellophane vary from 1/4-in. to 3-in. widths and cover a wide range of colors and designs. Some incorporate aluminum foil as an edging material or have a foil inserted between the folds for purposes of greater lustre and brilliance.

Many approaches

To the manufacturer, wishing to stimulate gift buying by some package change, many approaches are open. If now using printed film, he can have a holiday design feature incorporated in his standard wrapper or bag for a limited period. He may buy a stock band or wrapper which is applied right over the standard package. He may apply an attractively tied ribbon in the same manner. In



1—Prior to the imposition of wartime restrictions, the charm and value of visible packaging had given impetus to the use of transparent films for products of all kinds. Hosiery and lingerie manufacturers were quick to realize that delicate fabrics would appear to greater advantage in visibility packages, with printed effects and color contrasts enhancing the appeal. Photo, The Dobekmun Co.



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these cases, any stock which is not sold during the holiday season is readily reconverted by removing the holiday band or wrap.

Multiple and combination packaging

The manufacturer may create family sets made up of an assortment of his products which may then be overwrapped in printed film to show the contents of the assortment while suggesting a gift purchase by the design of the wrapper.

Limited price chains and some department stores have been outstandingly successful in intelligent packaging of related items. In many cases, a re-use container is used to hold the items, the combination then being attractively gift wrapped. Multiple packaging of a dozen or more like items is equally effective. Common examples are chewing gum, razor blades, cigarettes and candies.



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Inexpensive but practical method of accomplishing decorative packaging is to use overwraps of printed transparent film. For the gift season, they remain on the packages for added display value. After season has passed, retailers remove them for normal sale of the products. Illustrations show this application for the following: 2—Toiletries. 3—Domestic wines. 4—Tea and coffee products. Photos, The Dobeckmun Co.

The larger manufacturer or store may, of course, have a printed wrapper or bag designed for exclusive use.

Opening tape adds color accent

Another decorative touch which contributes to the consumer's convenience is opening tape applied to tight-wrapped cartons. Colors of the tape may contrast with the color scheme of the package or may harmonize with it or the tape may be printed with slogans or instructions.

Color variations

On a cellophane bagged line of candy, one producer stepped up display value smartly by flaring the tops of the bags which were then banded with mixed colors of pressure-sensitive tape. In another case, the major color in the design printed on transparent bags, was broken up into equal quantities of red, green, blue and yellow. In packing the bags, the manufacturer mixed up the colors so each was equally shown in each dozen.

Laminations

Cellulose acetate films laminated to paper or board contribute high lustre, soilproofness and durability. The paper may be laminated after printing using a fully transparent adhesive. In other applications, opaque color is added to the adhesive giving a very rich, colorful effect. The film may then be printed for identification purposes, or labels may be attached to it.

A third process involves printing the acetate before laminating. In this instance, the adhesive may be transparent, thus showing the paper color behind the design, or it may be colored to add any desired background color to the design.

In making domed cosmetic containers, a thicker acetate, three mils or over, is generally laminated to the printed paper. This gives rigidity and a plastic look to the finished container, as well as long-lasting brilliance.

Decorative foils

by C. F. Manning

With the richness and depth of brocade, the inimitable lure of precious metals, and the magnetism of light and color, decorative foil attracts and holds the eye in a way that is not achieved by other materials. The value of metal foil for decorative and display purposes lies in its highly polished surface and the wide range of effects that may be produced by printing, embossing, and lacquering.

The most popular of metal foils is made from aluminum, because of its brilliant printing surface and adaptability to packaging. The majority of decorative metal products are furnished in lightweight foils, wax mounted or glue mounted to various types of papers and films, depending upon the ultimate use. For example, on beer and beverage labels, the papers are sulphite, or ground wood sheets, solid glue mounted to foil.

It is true that during the past few years package uses of aluminum have been severely restricted. This metal has demonstrated its fitness for a great many military needs, some of which are still in the "hush-hush" category. In fact, military needs take 95 per cent of all aluminum supply at present, but—come V-Day—it will become one of the most available packaging materials.

For candy wraps, foil mounted with glue and wax to lightweight tissues, bond, or glassine is preferred. For candy box wrapping the most satisfactory stock is foil, solid glue mounted to sulphite papers. Tight and loose wraps are made up of thin foil, solid glue mounted to lightweight bonds.

In addition to the above specifications used in industries of large volume business, other stocks are made up to take care of specific requirements. Plain foils, less expensive than decorated ones, are used where there is no particular advantage in decorations—containers for tea, chewing gum, cigarettes, and some types of candies.

Decorative foils are easily mounted to boards for the production of cartons, boxes, and displays. They have been used with outstanding success for such items as: cosmetics, gift boxes, greeting cards, fancy candy boxes, labels, counter displays, Christmas wrappings, window displays, seals, dials, etc. One interesting new development is the possible use of foil coated with various films for making draperies, ladies' shoes, bags, millinery etc.

Foil in its various forms may be color printed by any of the standard processes—letterpress, lithography or

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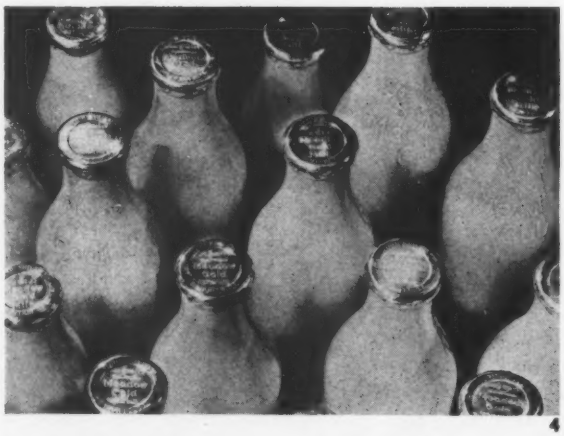
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1—On food packages, metal foil is used for its protective qualities as well as for its decorative value. Foil takes color printing well, and printed areas provide effective contrasts with lustrous metal surfaces. 2—Beverages of various colors in glass packages of still different hues, utilize metalized paper and metal foils for labels and bottle caps. Photos, Reynolds Metals Co.



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gravure, with the latter method favored where large volume is a factor.

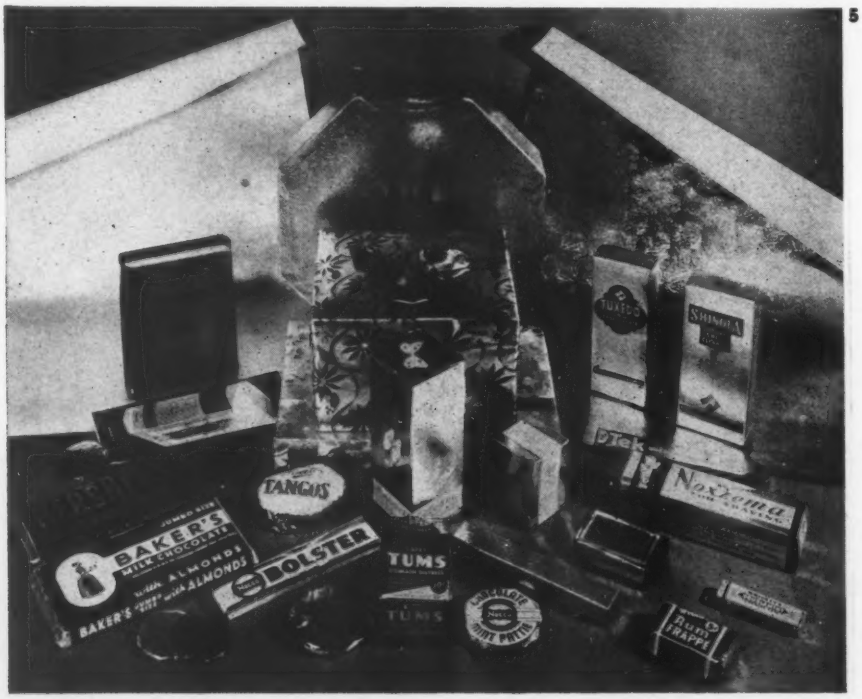
Because foil lends itself perfectly to printing, lacquering, and embossing, it presents to the designer limitless opportunities for new and sensational effects.

In the printing process, transparent inks may be used in combination with opaque inks. Where transparent inks are used, light penetrates the color, hits the metal foil and is reflected back through the color. This produces brilliance and high lustre, but if only transparent colors are used, legibility may suffer where brand name or other important copy should be featured. By using opaque inks with transparent, the brilliant reflection of light can be controlled and used where it is needed to produce the best effect. Any competent commercial artist can combine transparent and opaque inks to produce the effect desired.

Being lightproof, metal foil guards products containing oils or fats against the action of rancidity which is accelerated by light. It is an excellent insulating material, possessing power to reflect 95 per cent of all radiated heat. Metal foil is also moistureproof (see *Metal Foils, Technical Aspects*, p. 432).

There are some uses of foil which are not strictly decorative, though they have strong "leanings" in that direction. One example is the use of the lustrous metal for secondary closures or bottle caps as an added precaution against tampering. These caps are easily and quickly applied; just as easily removed, but their absence from an accustomed place is warning to the purchaser. The package buyers have been quick to apply decorative principles to this material which is used in the case of bottle caps primarily for protection.

Most packages are made to serve utilitarian purposes. Decorative foil packages fulfill this need while offering beauty and distinction in a fresh and alluring way.



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3—Metal foil, long a reliable material for packaging foreign style cheeses, sometimes — by direct application of printing — becomes the decorative label as well as the protective wrap; in other cases it is used with a separate printed label. 4—Gleaming caps of foil, easily removed, help prevent contamination. Photos, Aluminum Co. of America. 5—Foil, unavailable now for purely decorative packaging, will return in full flower when peace comes. Photo, Reynolds Metals Co.

Decorative tissue papers

by G. H. Krueger

Having grown from an obscure spot to a position of importance in the packaging field, decorative tissue papers may rightfully be called a "Cinderella" wrapping material. Articles as different as fruit and vegetables, and most delicate of milady's fineries depend in one form or another on tissue paper to glorify as well as to protect them. As Americans, we are not especially interested in the background of materials that we commonly use but the history of decorative tissue paper is most interesting and therefore a few words of introduction might be worthwhile.

The idea of decorative tissues originated in the Old World. During the 17th and early 18th Centuries in Western Europe, hand boxes for traveling were used by ladies of fashion. These hand boxes were covered with paper similar to wall paper, mostly of floral design patterns. Late in the 18th Century, shopkeepers made use of thin straw-colored paper for twisting into conical shapes. It was the beginning of paper bags, for they held such useful items as sugar, flour and the usual run of household items. In the latter part of the 19th Century, postal rates were very high in Germany, and the Scandinavian countries. The paper commonly used for envelopes was very heavy, and these envelopes cost a lot of postage in their own right. Therefore, as an economy, lightweight papers were used for envelopes, and to make them opaque, so that the contents of the letter were confidential, envelope linings of light colored tissue paper came into general use.

It was a French publication which, in 1903, gave the United States the first story of envelope linings. This might be called the birth of decorative tissue papers so far as the United States is concerned.

It is interesting to note that in this country the linings were used chiefly for their decorative quality, because our envelope manufacturers had, from the beginning, been concerned with the manufacture of opaque paper for en velope purposes. By 1917 stationery manufacturers in this country generally used fancy lined envelopes, and the vogue spread like wildfire. Through the 1920's the demand for envelope linings was very large although the cost of printing and design was high, and the work in comparison to what it is today was crude. So-called modernistic designs were largely used for envelope linings, and a lot of geometrical patterns were produced, largely through the medium of drawing board and instruments.

With the 1930 crisis linings started to be out of date, largely because the envelope manufacturers were forced to lower prices because of the depression. Today envelope linings have virtually disappeared, but decorative tissue has a much broader market as a wrapping and packaging gift material.

Well wrapped and attractive packages have tremendous appeal. It is fun for the person who gives the present to wrap it attractively. It brings out his own creative genius, and artistic ability. It is also a distinct pleasure for the recipient, because even a moderately priced gift wrapped attractively makes a fine impression.

Consequently, the packaging field or gift wrapping field attracted some of our best designers and artists. It is to them that much of the credit for the popularity of decorative tissues should be given.

Likewise, the equipment people became interested, and have developed superior printing and other equipment, so

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1—Tissue wraps protect sensitive surfaces as well as decorate and identify products. 2—Decorative tissues, water-color printed, with "choke roll" or solid background designs. Photos, Tuttle Press Co.

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3—*A wide range of items may be kept clean by the tissue wraps which at the same time serve to dress them up for sale. Photo, Tuttle Press Co.*

that the method of printing and drying has produced a well printed sheet of lightweight paper. The ink manufacturers have cooperated, with the result that the brilliant tone effects of various printing inks were improved, and real quality color printing on tissue paper is now an accepted fact.

Tissue paper is defined as a paper that is 20 lb. or less in basic weight, 24 by 36—500. This means that a ream of paper containing 500 sheets, each sheet 24 by 36, weighs less than 20 lb. Plain tissues are usually 10 lb. and the weights used for printing are usually 18 lb. or 20 pounds.

Plain tissue papers

Tissues commonly used for commercial packaging and wrapping, are furnished in sizes 20 by 30 for No. 1 white, weighing 7 lb. per ream, and 24 by 36 in No. 2 white and manila, weighing 10 lb. per ream. The main function of No. 2 white and manila is that of giving protection instead of refinement and beauty to the contents and to the package. They are utilitarian tissues for the protection of china, glassware and fragile merchandise. Department stores use the commercial tissue for lining boxes, and many other uses where protection is necessary.

Non-tarnish tissue (jewelers' tissue)

A sulphur-free tissue, commonly called jewelers' or silver tissue, is used to guard against product discoloration due to contact with the air or unclean tissue. It is used to wrap such articles as those made of gold, silver, copper, brass, etc. There are two kinds—white and kraft. White anti-tarnish or silver tissue is a specially treated No. 1 grade. It contains a higher grade pulp and must be handled more carefully all through the manufacturing process than regular No. 1 white tissue. Most kraft tissue will pass this non-sulphur test, too, for the reason that the processing of kraft pulp differs from that of sulphite pulp which is used in the manufacture of white tissues. Kraft tissue, however, has the same color as ordinary kraft wrapping paper. Hence hardware items, machinery parts, use this while white is used on the higher quality, gift-type items, where appearance is a factor.

Fruit wrappers

These wrappers are made of tissue usually from 12- to 18-lb. stock. The wrapping protects and also beautifies the product, and the customer feels that he is buying fruit that is well and properly packed. To the citrus fruit wrappers, and apple wrappers a little oil is sometimes added, so that the fruit arrives in perfect condition.

Special printed wrappers are commonly used, which serve to identify brands. Sometimes stock designs are used, but large packers of fruit and vegetables identify their products with special printed tissue wrappers.

Florist tissue

This is the 12-lb. sheet usually M.G. of No. 1 white tissue which is used by retail florists in flower cartons to protect the delicate blooms as well as to frame the flowers and to give them an additional feminine touch. Waxed green tissue finds an outlet here also, where it is frequently used as an inner wrapping liner for bouquets and potted plants.

Bottle wrapping tissue

The tissue used for the purpose of wrapping bottles, wine, whiskey, etc., is of kraft base, for the reason that good twisting qualities are required. This tissue is generally imprinted with some special design or advertising copy and occasionally a special watermarked tissue is used as a base stock. It gives protection, adds eye appeal, and keeps the merchandise clean and free from lint during shipment.

Shredded tissue

It must be mentioned too, that both plain and waxed tissue, cut into fine even shreds finds an important use as a soft, clean and highly resilient packing material. For instance, in the packing of china and glassware, shredded tissue has taken and maintained its place along side of cellulose wadding. Its protective qualities are good, and its cost nominal. Colored waxed tissues are frequently used for packing candy, such as purple and green for Easter sweets.

Conclusion

It is quite obvious that decorated tissues are continuing to gain in popularity and there is no reason to doubt that they will always be a standard item for the wrapping of packages and gifts.

As printing methods constantly improve, new and more attractive papers are being produced. Insofar as the plain tissues are concerned, it is quite obvious that it already is an important packaging material. Year after year, we find its use spreading. Packaging has been on the march for sometime; designers and manufacturers are looking into the postwar future, keeping their ears attuned to the times, and cannot overlook the effective uses to which tissue can be put in creating eye-appealing packages.

Decorative ribbons, tapes and ties

by N. J. Strauss

Decorative tying materials, in general, can be classified into three broad categories. There are those ribbons made of cotton those made of cellophane and those made of rayon or rayon and tinsel.

The weftless type of cotton ribbon is made by passing the cotton yarns through a binder material so as to form a flat, smooth, uniform tape. This tape or ribbon may be had in either solid or combination colors and it frequently is passed through a crimper to add a decorative effect. The tape itself may be had imprinted with either names or decorative patterns. This cotton ribbon may be had in widths from 3/16 in. up to 1 in., packed either in bulk spools for commercial or industrial use, or in small units for home use. This cotton ribbon has enjoyed wide popularity for a great many years and no doubt when cotton is again freely available will become one of the most important decorative tying materials.

Some cellophane ribbons are still being made because under Limitation Order L-20, manufacturers may still use end cuts or reject cellophane for the purpose of making ribbons. These ribbons were among the most popular before the war. They are generally printed or decorated and folded to add a strong tying edge. Having all of the brilliant sparkle and lustre of cellophane, these ribbons add an unusual decorative quality to the package. Cellophane ribbons may also be laminated in combination with tinsel and with cotton or rayon threads. Cellophane ribbons, too, are packed in bulk spools and sold through various jobbing outfits to manufacturers and retailers throughout the country. They are also put up in small consumer rolls, bolts and spools for home use. These ribbons are generally made in a full variety of Christmas and spring shades. When cellophane itself is again freely available, these ribbons will no doubt take their traditional position.

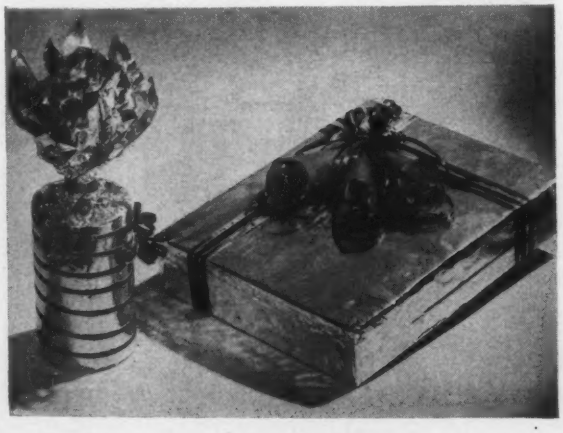
Fabric ribbons generally are made of rayon or rayon and tinsel. These are perhaps the oldest decorative ribbons; they have been used since time immemorial for decorating gift packages. Made on narrow ribbon looms, the variety of designs and combinations are inexhaustible. A form of fabric ribbon that has enjoyed tremendous popularity in recent years is the slit fused ribbon. This is a ribbon that is made from wide acetate rayon fabric, slit under the fusing process, whereby an artificial selvedge is formed in the slitting operation. Slit fused ribbons can be made in great quantity in all widths from 1/4 in. up. Due to the fact that they are slit, the width remains absolutely constant. Various forms of imprinting and other decorations may be applied to these ribbons. All fabric ribbons, whether woven on narrow looms, or slit and fused from wide fabrics are extremely strong and easy to tie. Frequently these ribbons may be re-used the second or third time. In fabric ribbons, there are many varieties of weaves from the very sheerest chiffon or ninon type of weave to the traditional heavy satins and taffetas. These ribbons, too, are packed in large bulk units for industrial or commercial use and they are also available in small spools for home use.

The use of decorative tying material has grown to sizable proportions during the past ten years. It has become an American idiom to decorate a gift package. Not only have tying materials been used in the home, but their value has been recognized and accepted by merchants throughout the country who, too, use decorative ribbons as closures in their holiday packages.

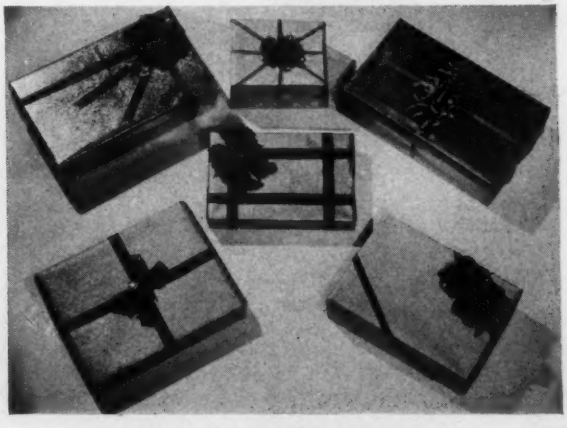
During the war period, many of the manufacturers have devoted a large percentage of their capacity to war work. Narrow looms have been employed in weaving nylon and Fiberglas tapes and slitting and fusing machines have been most important to the entire war effort in the production of all types of slit tapes for war purposes. The war period has taught the ribbon manufacturer many new arts which he no doubt will employ postwar.

1 & 2—Packages have out-of-the-ordinary air when decorative ribbon or tape is used. Photos, Freydberg Bros.-Strauss, Inc. and Fibre Cord Co.

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Decorative and re-use boxes

Since fancy packaging has always been indispensable in the jewelry and cosmetic fields, these industries have not only experienced wartime shortages in the materials from which their products are made, but they have been deprived of many of their accustomed materials for packaging. This has had two results: first, a cheerful acquiescence in complying with restrictive orders as their contribution to the war effort, and, second, a manifestation of ingenuity in the use of substitute materials.

In the jewelry field, where metal containers have for many years been the most widely used, three changes have developed. Firstly, a type of pulp material which can be pressed or embossed into shapes similar to those previously stamped out of metal was found. The same mechanical covering equipment was usable if the inside dimensions of the new cases were the same as those of the old metal containers. It was thus found possible to continue the use of most of the equipment and dies formerly used for "finishing" the linings and inside fittings.

The second substitution in the jewelry field was the change from metal to cardboard covered with imitation leather, velvet, etc. Only those shapes which can be made out of scored cardboard are possible. Fancy shapes—except for octagonal corners and certain types of extension bases—are not possible under this process.

The third substitution has been in the use of wooden packages to take the place of critical cardboard. Wood permits a wide latitude of design effects, and many interesting wood packages have already found their way into the market. Wood boxes are almost entirely handmade and so may be used only for the more expensive jewelry items. A wide variety of finishes, ranging from natural wood effects to lacquer finish in any color, is still available for this use.

Gumwood is probably the most popular wood for containers, though most of the cabinet hardwoods—cedar, walnut, mahogany, oak, sycamore, poplar and maple—are equally usable. Cedar was popular as the material for storage boxes because the odor is generally presumed to be a moth preventive.

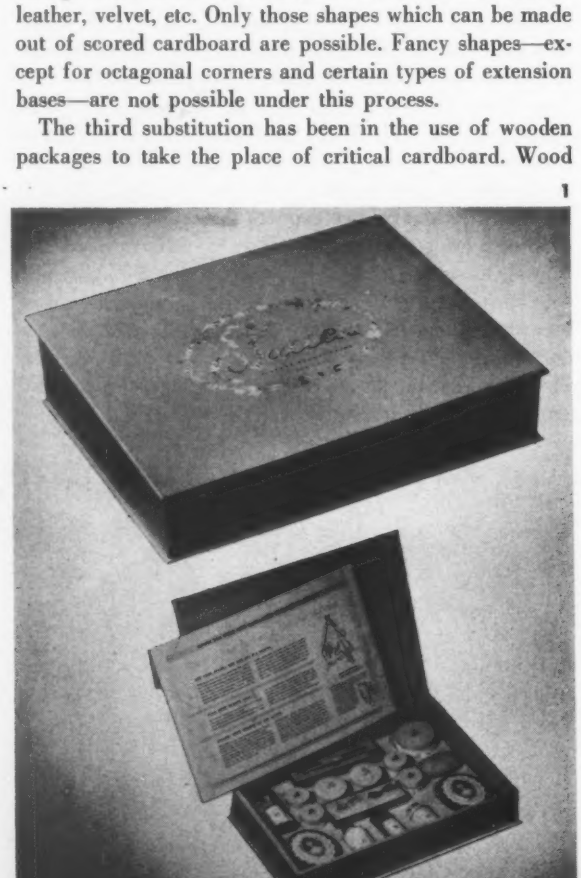
Veneers frequently cover less expensive woods used for the frames, though the covering may be of embossed paper, simulated-grain fabrics and leather-like sheets. Special machinery, however, is necessary to apply such final finishes. In the days of luxury containers, silks, satins, duvetyns and even mirrors formed all or part of the interior finish.

Availability a problem

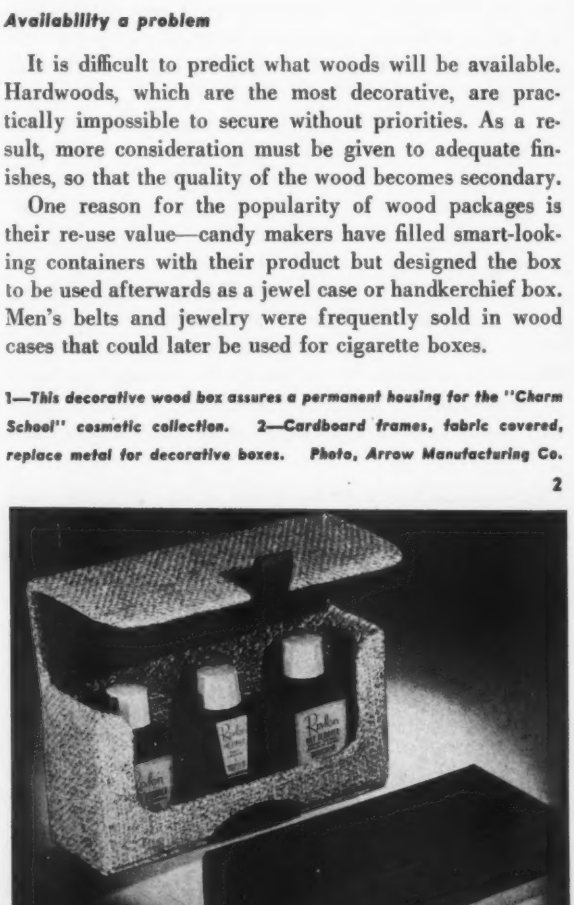
It is difficult to predict what woods will be available. Hardwoods, which are the most decorative, are practically impossible to secure without priorities. As a result, more consideration must be given to adequate finishes, so that the quality of the wood becomes secondary.

One reason for the popularity of wood packages is their re-use value—candy makers have filled smart-looking containers with their product but designed the box to be used afterwards as a jewel case or handkerchief box. Men's belts and jewelry were frequently sold in wood cases that could later be used for cigarette boxes.

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1—This decorative wood box assures a permanent housing for the "Charm School" cosmetic collection. 2—Cardboard frames, fabric covered, replace metal for decorative boxes. Photo, Arrow Manufacturing Co.



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3—Weatherproof wooden tool kits have many uses in factory and home. Photo, Pilliod Cabinet Co. 4—Still good looking, jewelry boxes substitute paper and fabric for metal. Photo, Arrow Manufacturing Co.

Die-cutting is one of the metal-trade tricks that has been adapted to fabricating wooden objects. A special process for sealing the pores of the wood makes permanent accuracy of contact points possible, and it avoids the moisture absorption which would throw the container out of gear. Pins and dowels have been used for hinging devices, and ingenious locking devices have been worked out by using dovetailed wood pieces.

Wooden tool kits, fitted with hinges and handles, are doing double duty as both storage and carrying cases. By methods of drying and processing, most of the moisture normally found in wood can be driven out, and the wood is protected against re-absorption of water which would ordinarily cause warping and swelling. Waterproof adhesives and finishes further facilitate the production of wholly weatherproof cases.

Wood packages for these specialized uses cannot be produced in every plant equipped for woodworking. It is to the advantage of a tool or precision-instrument producer to confer frankly with the makers of wood cases. A sample of the intended contents—or at least an accurate sketch of exterior shape and dimensions—is a prerequisite.

Production methods have been developed for making small boxes and cases in unusual shapes and finishes for use where only small packages are needed, and where the use of wood has been very limited in the past. They are especially suitable for packaging small cosmetic articles, rings and watches, and will no doubt introduce into these fields that beauty and distinction which can be achieved only in wood. They will be manufactured on specially designed machinery which will make it possible to offer a type of package formerly infeasible in quantity at reasonable prices.

There has been a great increase in the number of screw machines for war production, and many of them will be available for the peacetime manufacture of novelty ornaments and decorations for packages.

Today's wooden lipsticks are made on high speed screw machines. They are acceptable in appearance, practical to use, and wherever they have been introduced they have been accepted by the consuming public as a "war baby."

Practical and durable compacts are being made of wood, cardboard and combinations of these materials. Fancy shapes are not always possible, but these materials do permit interesting design and effective use of such novelty coverings as bengalines, moires, rayons, novelty ribbed materials, interesting printed cloths, etc.

Leatherette and coated fabrics

These materials have shown a new usefulness since priorities and restriction of basic materials have been made necessary as war emergency measures. Leatherette, otherwise known as artificial leather, and Keratol, coated fabrics, etc., because of their substantial, durable construction, have always been favored as covering materials of those types of containers, boxes or cases of a semi-permanent nature. It should be noted, however, that manufacturers of leatherette have been forced to curtail their production because of government restrictions placed upon the use of pyroxylin and castor oil.

XUM

Gift wrapping and packaging services

Due to the paper and labor shortages, many stores discontinued entirely for the duration their practice of a free gift wrap to every customer requesting one. Those that didn't discontinue either instituted a policy of a small charge for gift wrapping service and materials, or reduced such free services to the simplest forms and shortest seasonal operations. Because of the overhead of a gift wrapping service, many stores were glad for this opportunity to dispense with a practice which usually had to be written off to good will and promotion. Whether such services will be resumed after the war depends entirely upon how essential such operations are as promotional aids in a competitive market. The desire for eye-appealing gift wrapping will be strong when all the beautiful packaging materials are again on the market to tempt the buyer. If a certain store operator decides to attract customers to his store with a free gift wrap, other stores in his city will soon do likewise unless permanent discontinuance of a free gift wrap can be maintained by mutual agreement.

Undoubtedly the end of the war will bring back many of the individualized gift wrapping services where the customer pays the bill for the glamour packaging. The most notable example of this type of service is at Neiman-Marcus Co., Dallas, Tex. Started in the thirties, this gift wrapping service has continued right through booms, depressions, and wars. Even when other stores couldn't make such operations pay, Neiman-Marcus must have known the formula for making gift wrapping profitable. Throughout the war period, although most decorative materials were unobtainable, this store has developed sources for small quantities of left-over stocks, or used to best advantage whatever wrappings were available.

One reason for success is the irresistible topical novelty of the packages. A new play, such as "Oklahoma," for example, inspired a package simulating a "Surrey with the Fringe on Top." An overall design adapted from a photograph of the Dallas skyline was the pattern for another package. A lunch box decorated with stylized designs of locomotive was offered for the train traveler to avoid the diner dilemma.

The store also specializes in gift wraps for special occasions—weddings, birthdays, Mother's Day, Father's Day, service men, etc.

Labor problems have been solved by offering jobs in the gift wrapping department to women skilled in sewing or fine needlework, students from local art schools, and others deft at handicraft.

Mechanics of the gift wrapping are concealed, but display booths showing examples of the wraps prepared in the department are shown at strategic store locations. Customers are given numbers, so that they may do other shopping in the store while waiting for their purchases to be gift wrapped. Or they may wait in comfortable chairs placed near the gift wrapping booths.

There are other gift wrapping and packaging services, such as that operated by Mary Lull, which will set up a special service in a store and manage it on a service-free or concession basis. The department store or manufacturer may find the answer to many postwar gift packaging problems in services of this kind. Through such plans, the service may be employed to work out complete plans, give the benefit of their ideas on designs, purchase the materials and even do the packaging. Organizations of this type have been limited in scope during the war period, but will be in a position to perform such operations on a large-scale custom or concession arrangement once they can obtain sufficient materials and labor.



1—Gift wraps may be tailored to the desire of the customer, or made to fit a season or a special occasion. Illustrated are: a birthday wrap featuring the "Happy Birthday" song; a special wrap for a baby's present; a Mother's Day gift packaged in Gibson Girl manner; an autumnal wrap with fall leaves and colors; a wrap featuring a city skyline, for civic promotion. Photo, Nieman-Marcus Co.

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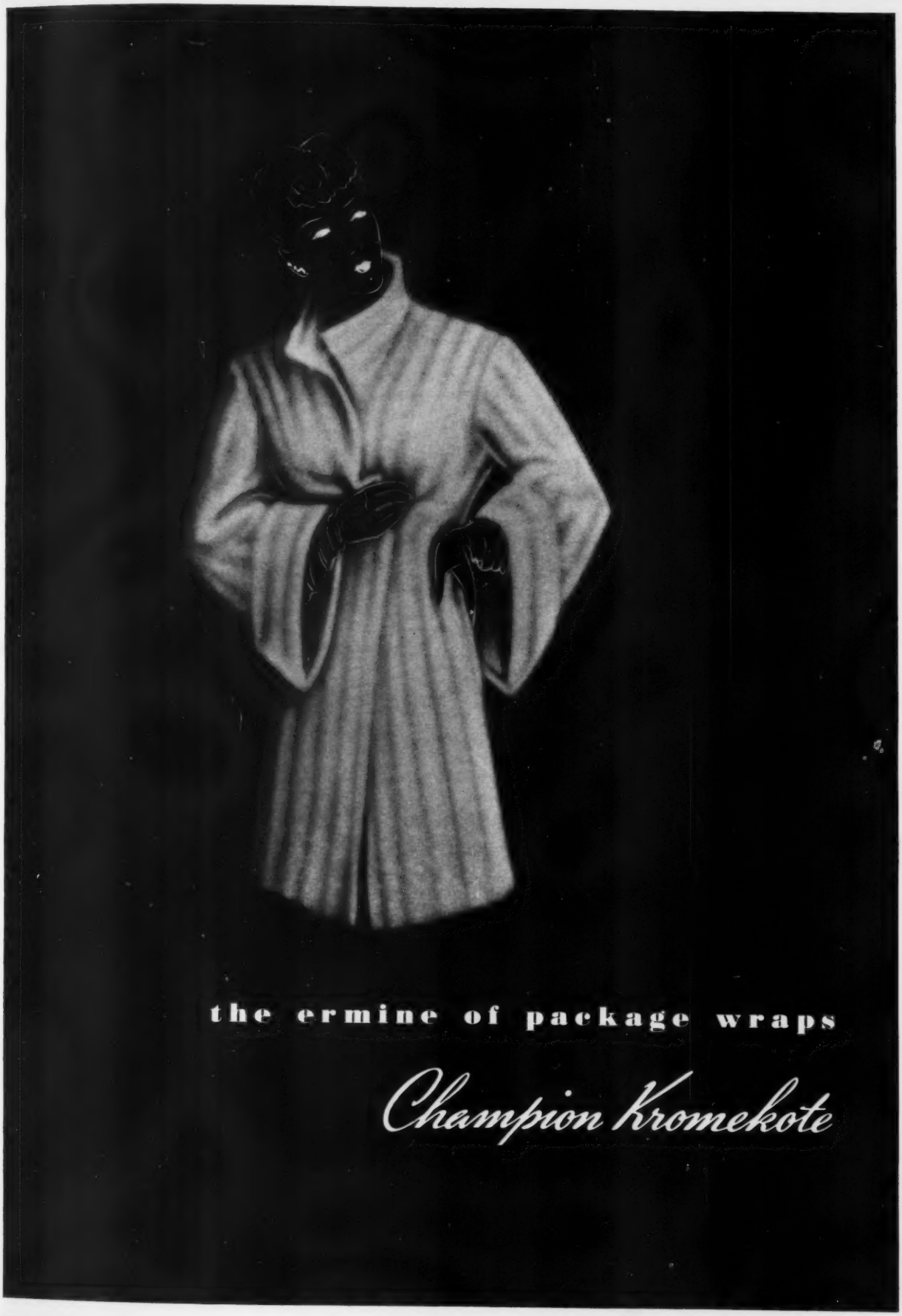
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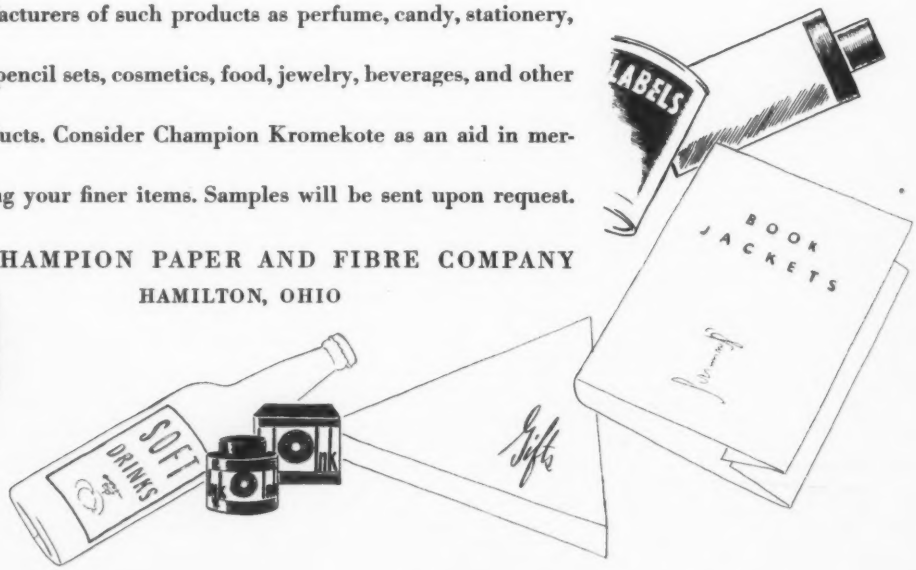
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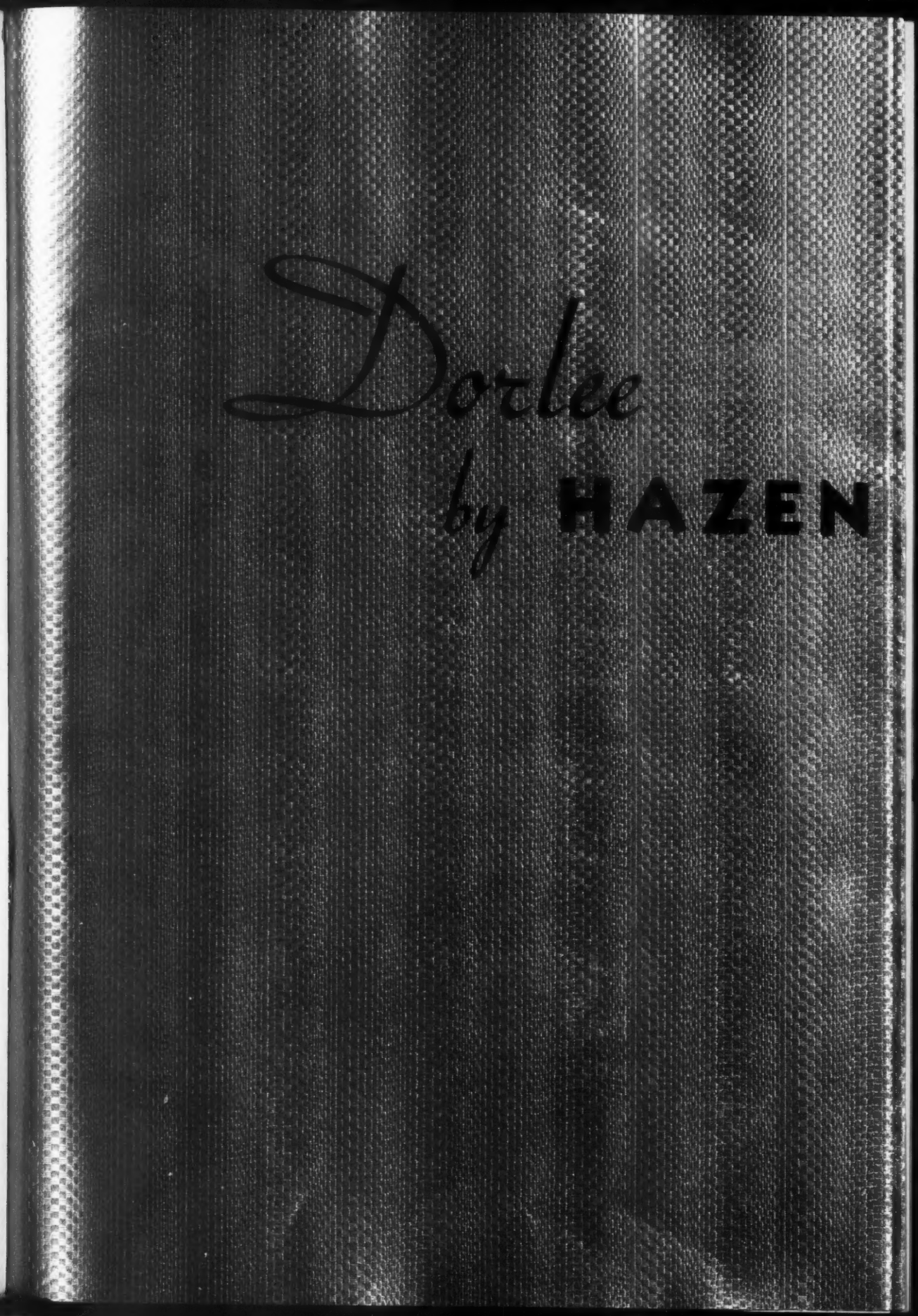
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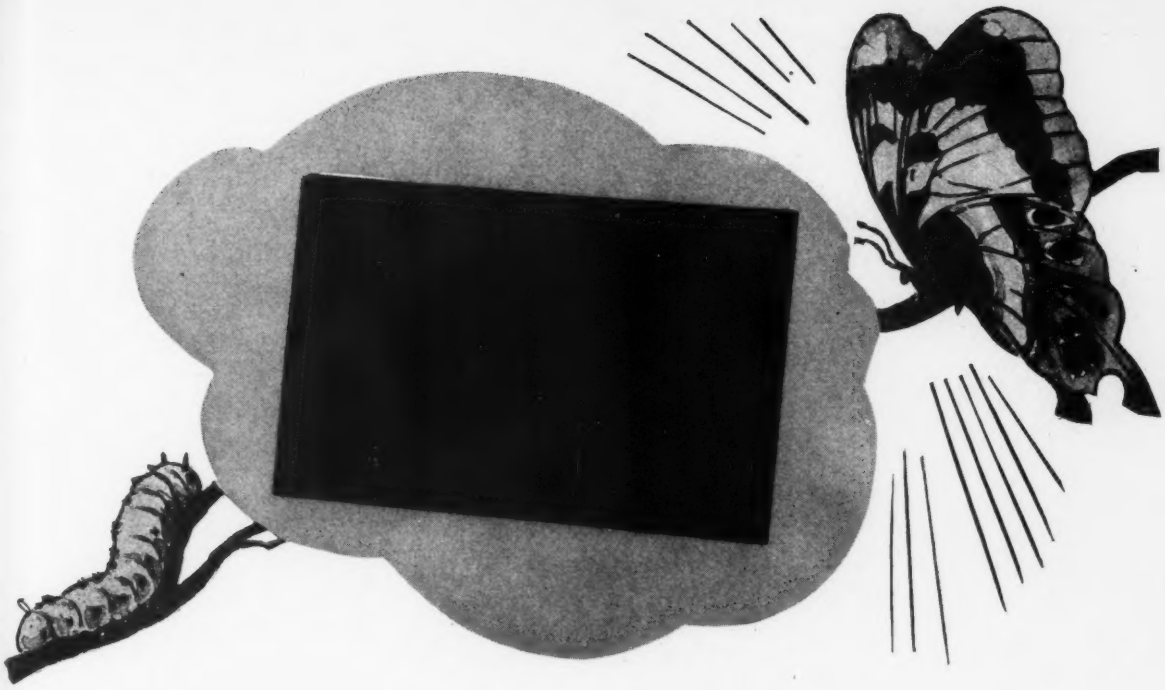
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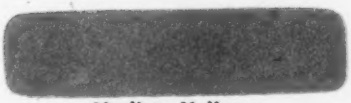
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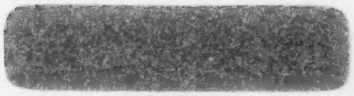

White

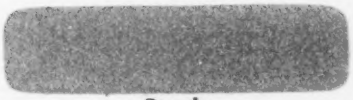

Gold


Black

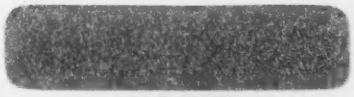
RAYON FLOCKS
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1/16 INCH

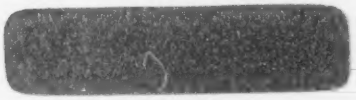

Rose Pink

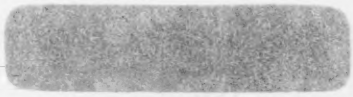

Pale Blue


Peach

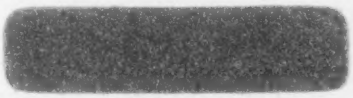

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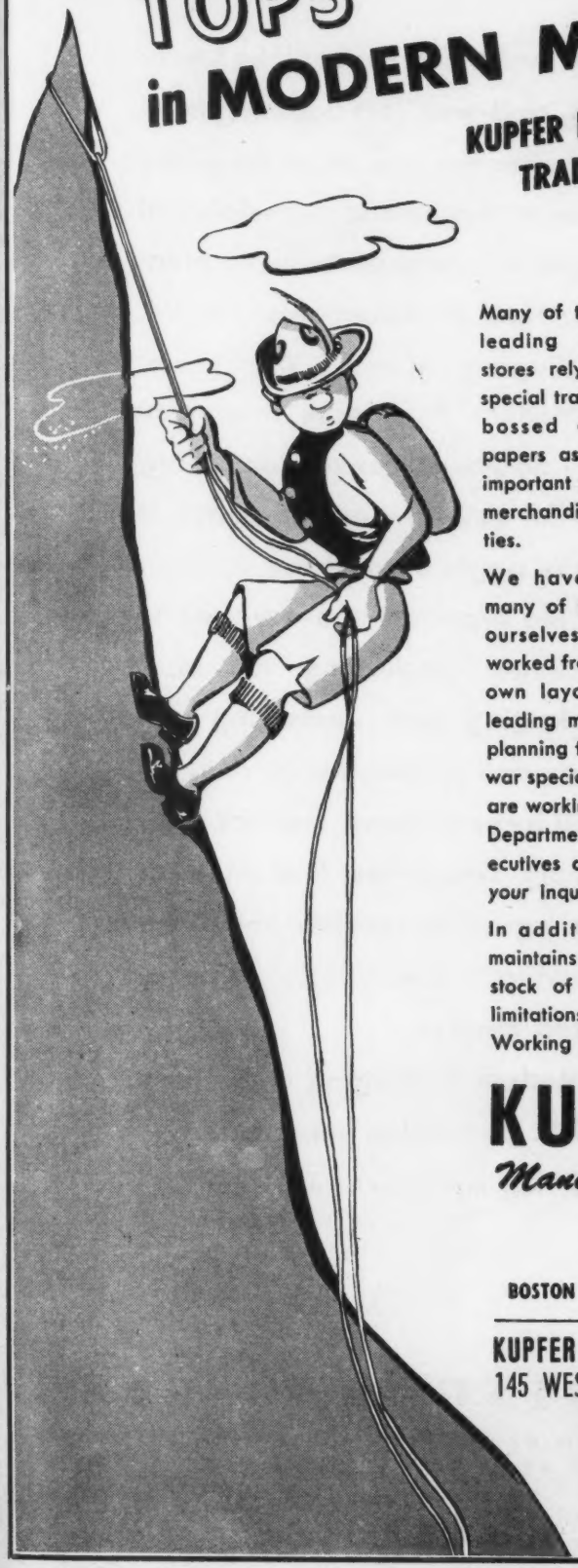
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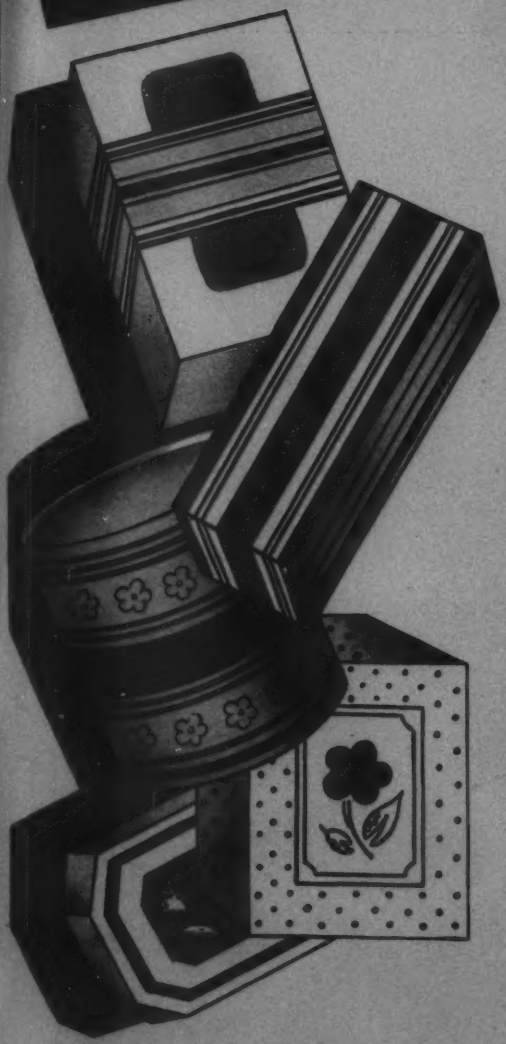
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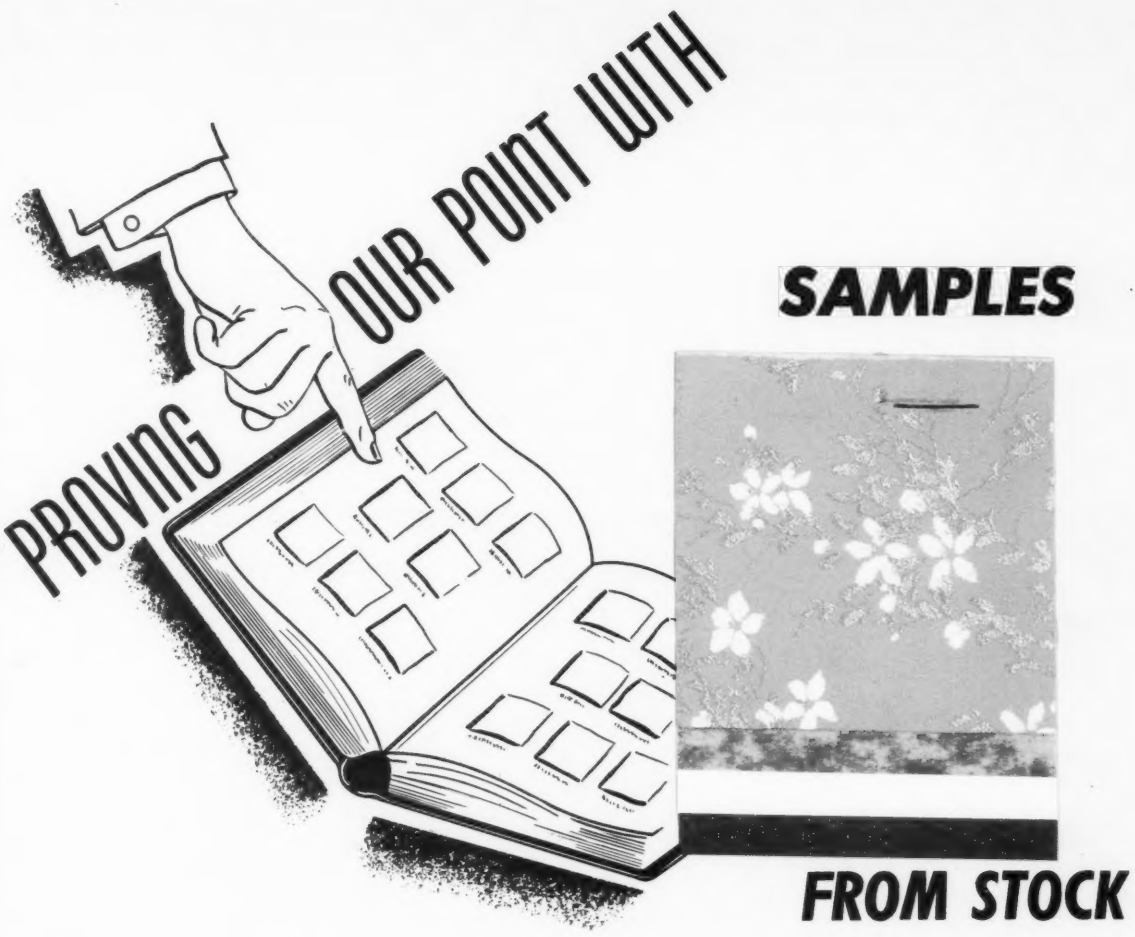


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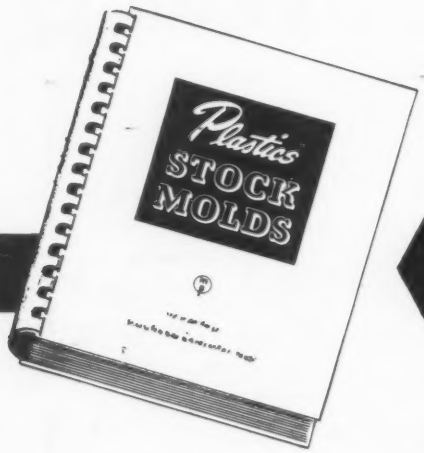
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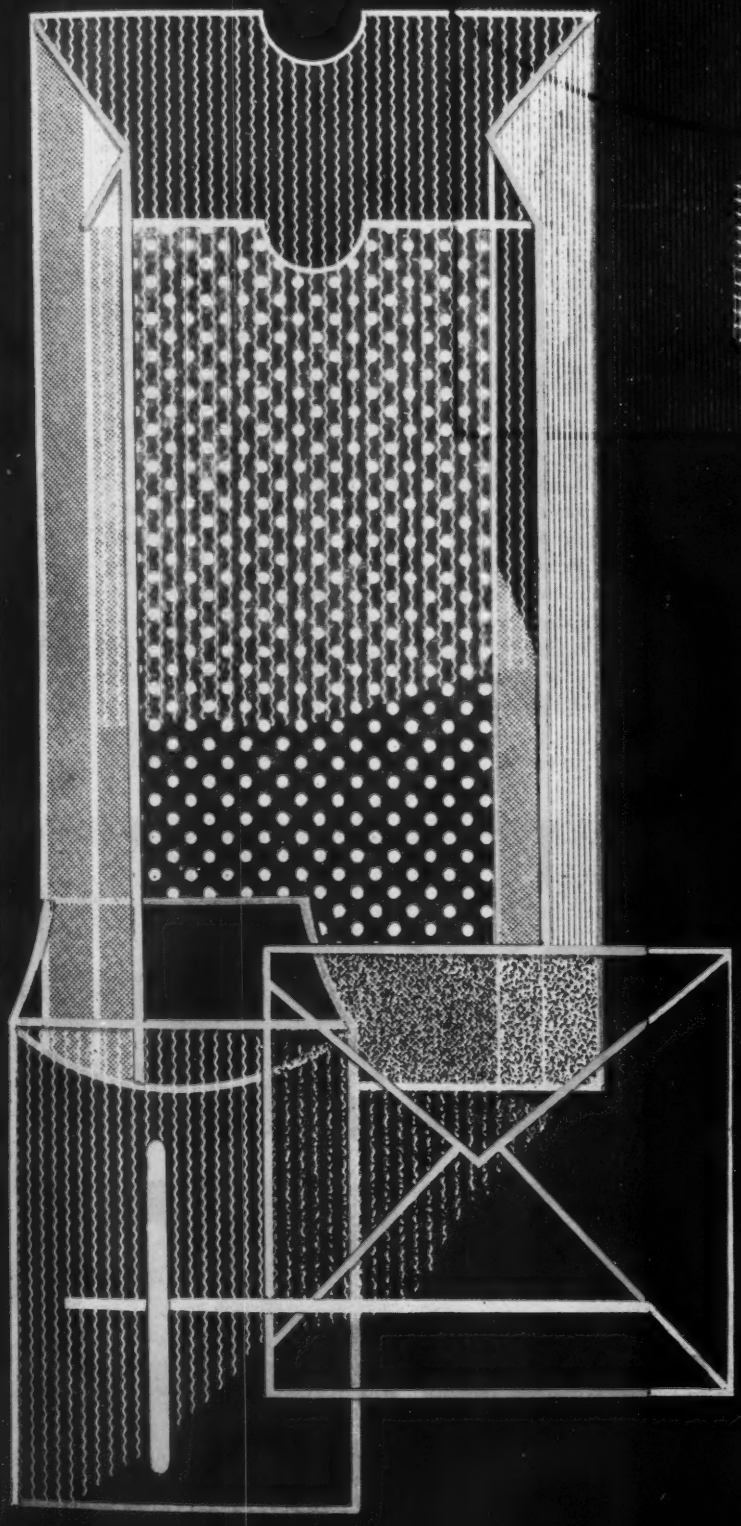
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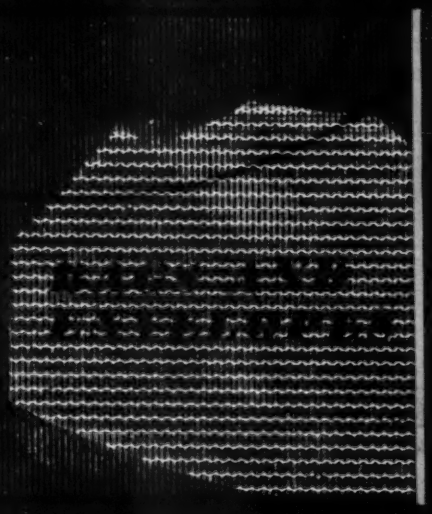
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Paper bags 258

Specialty flexible containers 261

Transparent bags 263

Metal foil bags 266

Merchandise envelopes and packets 267

Fabric bags (unit containers) 268

Textile bags 269

Heavy-duty multiwall bags 273

Bag sealing and closing 278

XUM

Paper bags

Dating back prior to the Civil War, the paper bag was first used simply as a convenient and economical method of carrying items from store to home. Today, it takes its rightful place among glass jars, tin cans and cardboard cartons as one of the standard media for product protection in the packaging field.

Some of the reasons for the increasing importance of the paper bag in recent years in packaging are:

1. Automatic packaging machinery has been developed for the filling and sealing of paper bags.
2. Methods of heat-sealing for paper bags have provided a tighter seal.
3. Better protective papers have been made available for paper bags.
4. Protective coatings have been introduced to make paper bags more efficient.
5. Better designing and printing have given the paper bag more shelf appeal.

The present scarcity of tin, burlap, foil and other packaging materials has brought about the use of paper bags for a large number of products formerly packaged in other types of containers. Lend-Lease and military shipments include bags of almost every type from small envelopes for lemon drinks to heavy-duty bags carrying 100 lb. or more of chemicals or foods. Bags-in-cartons have made possible conversions from metal packaging to paper.

At first thought, "bag" ordinarily connotes the brown paper bag which is used by every corner grocer, but this does not properly fall into the formal classification of paper packaging. Better examples of the latter are the bags used for coffee, flour, sugar, potatoes, rice.

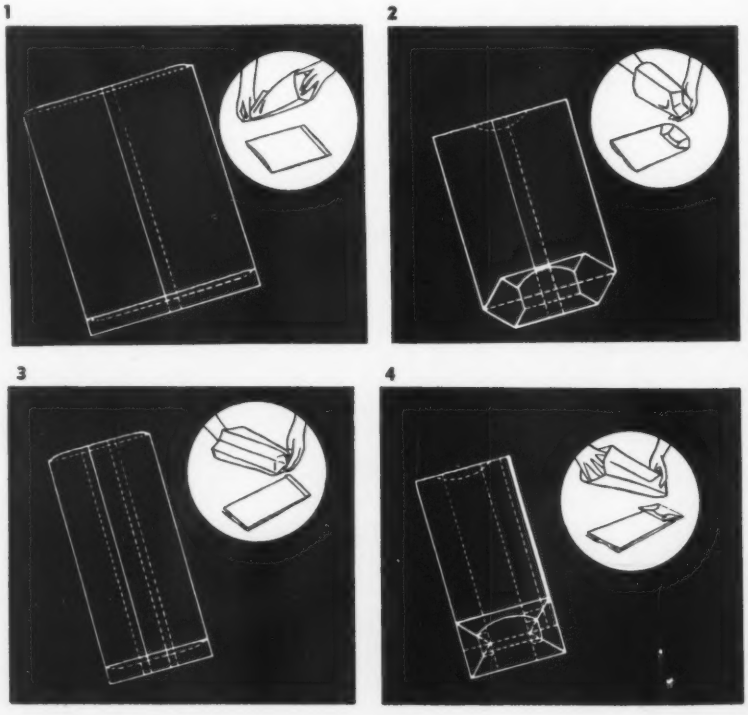
The definition of paper packaging comprises those paper bags that are filled and sealed in quantity before they reach the point of retail sale. The filling and sealing may be done at the factory, refinery or roasting plant, or by the grower, receiver or wholesaler. When the paper packages reach the retail outlet, they are stored, displayed, and sold to consumers as a complete unit.

There are four basic types of paper bags, all of which are illustrated on this page. Whether used for packaging or wrapping, paper bags fit into one or more of these basic classifications.

Variety of papers available

A variety of papers is available for bags according to the requirements of the product to be packaged. Kraft papers are used for strength, with a double thickness of kraft paper where added protection is required; e.g., the double-walled kraft bag for packaging of sugar at the factory. The second thickness of paper assures added protection against outside moisture, dust, dirt, and other contaminating matter, and also enables the package to withstand handling in shipping, storing and delivery.

Where the product contains oils which would seep through paper, an inner protective liner of glassine is often used. For example, the liner is used for coffee, to prevent coffee oils from coming through the outside paper



1—Flat bags were the first type developed, are the simplest in construction and the cheapest to make. They have a length-wise seam and the bottom is simply folded under and pasted. Many variations are available. 2—The satchel-bottom bag provides a flat base when filled, makes a roomy, neat package. 3—Square bags have folded bottoms similar to flat bags. Bellows folds at the sides reduce width of closed bag without reducing capacity. Good for fast production. 4—Automatic self-opening bags combine the desirable features of other types of bags. Note bellows fold and improved bottom. Filled, it makes a neat, squared-up package with stable base, center or side seam.



5

5—*Standard packaging media, paper bags are usually defined in the packaging field as those which are filled and sealed in quantity before they reach the point of sale. Among the classic examples are the paper bags for coffee, sugar, flour, potatoes, etc. Photo, Union Bag and Paper Corp.*

and it is used for salted nuts. Waxed paper liners are used in other cases to prevent grease or moisture from finding its way out of the package.

Where especially greasy products are to be packaged, a parchment paper is often used. Lard is packaged in such a bag; so is sausage meat. Many other combinations of papers are available to meet particular conditions. A study of the conditions of packing, storage, shipping, and handling will determine the paper or combinations used.

There are laminated combinations today to provide protective barriers to meet the requirements of practically any product that can be distributed in bags.

Large size multiwalled bags are used as shipping containers for many products, e.g., coffee, sugar and rice. The individual units for consumers are packed in these paper shipping containers for bulk shipments. In the case of sugar, 60 lb. are packed in units of twelve 5-lb. packages, six 10-lb. packages, or thirty 2-lb. packages. Shipping containers for coffee hold 24 1-lb. bags.

Paper bags are widely used as a wrapping material, in retail establishments, where individual purchases are placed in the bag so they can be carried home conveniently. Usually the only closure is formed by folding over the top of the bag. Some of the familiar forms used in this manner are:

Grocery bags (you carry your supplies in them)
Paper sacks (used in the super-markets)
Notion bags (for flat, small objects)
Millinery bags (same shape, larger size, for hats)
Garment bags (used by dry cleaners)
Liquor bottle bags (long and narrow to fit bottles)
Candy bags (used in every candy store)
Bread bags (just fits a loaf of bread)
Window bags (with a transparent window)
Shopping bags (large, of heavy kraft, with satchel-bottom and twisted paper handles, for carrying)
Beverage bags (short, automatic, with twisted paper handles, for bottles of soft drinks)
Bru bags (automatic, heavy, moisture-repellent kraft for wrapping products taken from refrigerators)
Nail bags (automatic, heavy kraft, shorter than grocery bags, used for nails in bulk and other hardware)

So many types of bags may be manufactured on special order that it is impossible to include a listing of all of them. A few examples, however, will give an idea of their wide application.

Tarnish protection—Anti-tarnish papers of many kinds (i.e., papers formulated to be free of sulphur) are being made into flat bags of many sizes to provide protection for individual tarnishable items and are being used extensively for packing silverware. This development is a progressive step over the former use of these materials as wrappings. The use of anti-tarnish bags provides a neater and more lasting protection and is therefore desirable because it makes many products more readily identifiable and salable.

Cotton-lined bags—To protect delicate surfaces of mirrors, china, and glass, and to protect silverware from tarnish, excellent cotton-lined bags have been made available during the last few years. The cotton is first bonded to paper and the completed padded sheeting is then worked into bags, usually sewn. *(Continued on next page)*

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6—Paper bags commonly used by retail dealers. Top, left to right: the shopping bag with twisted paper handles, garment bag, bru bags of moisture-repellent kraft. Bottom, left to right: nail bags, beverage bags with carrying handles, bread bags, bottle bags. Photo, Southern Kraft Corp.

Automatic bag with transparent panel—To provide appeal of visibility for a variety of products, automatic bags are made with a panel of cellophane the entire length of the bag. However, such containers are highly restricted during this period due to the limitations on the use of cellophane and the shortages of labor and other manufacturing facilities.

Over-size and odd shapes—For unusual shapes—a long narrow bag for an umbrella, a huge cellophane bag in which to display a grand piano or an antomobile—certain companies are equipped to fill the order.

Sample mailing bag—Many small bags of various materials are now being made as direct mail pieces for samples, promotional stunts, etc. These have a mailing card attached to the bottom, carrying the advertising or promotional copy and a space for name and address.

The user of bags today must study his requirements carefully. There are three important considerations in making selections. First, to decide what type of paper or laminations of paper with other materials will give the required protection for the job to be done. Second, to determine whether such materials are available if the product to be packaged is for civilian distribution. Third, to study carefully the government directives concerning the supply of bags and paper supplies.

There are not only restrictions on paper materials used for bags, but on the various resins for adhesives and sealing compounds as well as shortages of metal for closures. Such limitations may completely change the type of materials to be selected. A careful study of the sections in this book on papers, laminations and government orders will be advisable before going too far with packaging plans during the war period.

Methods of filling and sealing paper packages are outlined in another section of this book (see p. 671). The use of filling and sealing machinery has definitely contributed a great deal to the present usefulness of paper as a packaging material.

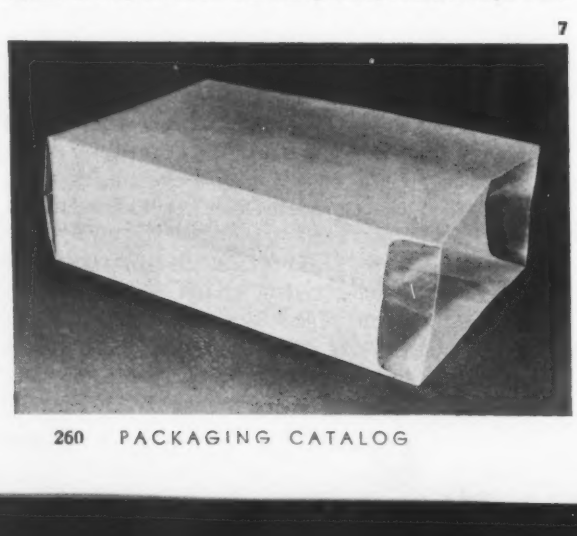
There are four basic shapes of paper bags. Each is illustrated on p. 258. Whether for packaging or wrapping, bags fit into one or more of these classifications.

The paper bag is among the most economical methods of packaging. Machines for making bags are so highly efficient today that it is possible to buy as many as 30 to 50 standard size paper bags for one cent. Modern high-speed machines are capable of meeting almost any production schedule to fill orders quickly under normal conditions. A single bag machine—depending upon the type of bag being made, the grade of paper used and the machine itself—is capable of turning out in excess of a third of a million bags a day, or to state it another way—ten bags every second.

When bags began to take their place as standard containers for tea, coffee and spices and other food products, the value of printing became important from an advertising standpoint. Today a variety of practical printing processes as well as specialized equipment have been developed for printing product identification, trade name and other information on bags.

7—Heat-sealed type bag with white bond outside and liner made of cellophane with top cutouts for heat sealing. Photo, Thomas M. Royal & Co.

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Specialty flexible containers

by Gordon Friend

The specialty flexible container is a highly specialized variety of bag or envelope. It has gradually earned for itself an important place in national packaging for the reason that it performs both protective and merchandising functions by utilizing many and varied types of films, including those made from cellulose, plastics and metal.

Obviously there will be some overlapping of this subject with the articles which precede and follow it, but the purpose of this discussion is mainly to point out features which are not included in those treatments which may have dealt previously with this subject.

Not many manufacturers of specialty flexible containers were in business 25 years ago. Despite the fact that some few of them do date back to the turn of the century, the majority today did not exist prior to 1920. The containers are used for foods, chemicals, textiles, tobacco and a host of other commodities and articles. They differ from ordinary bags and envelopes in that, in addition to being carriers, they are also used as sales displays and as shelf packages in the retail store.

Decorative

As special containers and shelf packages, they are almost always printed in multicolor designs. Most houses have their own art department through which color sketches may be prepared to meet individual requirements. Many methods of printing may be used—letterpress, rotogravure, aniline and offset. The industry as a whole is particularly conscious of the value of printing and designing in packaging. It is generally conceded that the industry has made as much progress in that direction as it has in the actual manufacture of the containers.

Protective

However, important as printing and designing are, the real service the specialty bag and envelope industry renders to national packaging lies in the ability of its product to protect perishable commodities from becoming rancid, stale and otherwise losing their freshness and quality through lack of proper packaging.

In order to produce such merchandise, the manufacturer of specialty flexible packages must first depend upon the films which he converts into bags and envelopes. The more moistureproof, greaseproof and airproof these films are, and the more they deflect the rays of the light, the better the containers will be in fulfilling their functions.

Materials

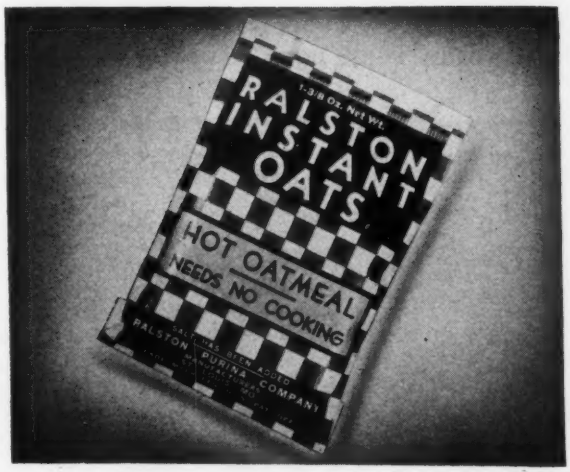
Prior to 1920, the specialty bag and envelope manufacturer had but few films at his disposal. The industry was limited by the fact that glassine, greaseproof parchment, dry wax and vegetable parchment were about the only papers then available. Since 1920, however, a great number of new films has been produced. These developments



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1—Specialty bags are made in sizes and shapes which are appropriate for the particular product to be sold, and also for the merchandising plans involved. Photo, Union Bag & Paper Corp. 2—A duplex bag, institutional size, for frozen foods which are kept under refrigeration until shortly before their use. Photo, Benjamin C. Betner Co. 3—Individual serving of ready-to-use cereal packaged in laminated opaque glassine bag for convenient protection. Photo, Thomas M. Royal & Co.

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have been largerly responsible for the growth of the specialty bag and envelope industries, broadening the field for manufacturers of these containers.

Glassine manufacturers, by learning to coat their papers with special airproof and moistureproof coatings, or by laminating their papers with agents having the same properties, have done their share in expanding this industry. Manufacturers of various transparent cellulose films not only enabled the flexible packaging industry to produce bags and envelopes which preserve perishable products remarkably well, but in addition these films added the sales appeal of transparency to the other advantages of specialty flexible containers.

To the list can be added metal films (mounted and unmounted), new coatings, new laminations and many new plastics. The war, of course, has made many of these films and coatings unobtainable, but the research work and the production of these materials have not been stopped. After the war new films, new coatings and laminations will come on the market, offering widening fields and greater opportunities to the specialty bag manufacturer who has the vision to see them.

The specialty bag and envelope industry has made progress in perfecting new equipment to handle the variety of films. Thirty years ago it was considered a very difficult problem to manufacture and print bags made out of glassine paper. Fifteen years ago the industry had a hard time trying to make bags of cellophane. Today the manufacturers of specialty bags and envelopes face the multiple problems of making containers out of many new films, new coatings and laminations. Now, however, backed up by proper research and long experience, progress goes on smoothly.

New techniques

One of the most interesting developments in the manufacture of flexible containers has been the art of making bags by means of heat sealing. It was found that if the seams in a bag were not securely cemented together, the package could not be airproof or moistureproof, no matter how good the films used might be. Heat was, therefore, used to weld together the seams of bags made from thermoplastic films, and the seams were for superior to those made with adhesives. Bags made from films which were not thermoplastic also could be printed at the joint areas with bands of thermoplastic materials and then could be heat sealed.

Uses for flexible containers

The flexible container industry has also made a good record in its war effort. Thirty per cent of its production is for war use, and the remainder for critical civilian needs at present.

Flexible packages are used as containers for large airplane engines as well as for tiny doses of sulfanilamide. Army and Navy rations, medical supplies, gun powder charges, delicate instruments and metal parts, frozen and dehydrated foods—all these and many others are packed in specialty bags and envelopes for safe shipment to the armed forces.

These war problems were tough, but were overcome by the work of Army and government officials in cooperation with the industry.

The specialty flexible container industry, now large, will grow. In 1942 it consumed 125,000 tons of paper in addition to great quantities of such materials as transparent and metal films.

There is every reason to believe that this industry will continue to grow. If wartime developments are indicative of peacetime trends, there will undoubtedly be many ingenious new uses for the flexible container.

For a long time there was a need for inexpensive packaging equipment to open, fill and close these containers. However, such equipment was coming out before the war, and in the postwar period many new machines will be available to packagers of foods and other products.

4—Decorated unit bag, eye catching, convenient; made of foil and acetate. Photo, The Dobeckmum Co. 5—Laminated cellophane is heat sealed to form consomme mix packet inside stapled folder. Photo, Arnold Printing Corp. 6—Heat-sealed duplex cellophane bag. Photo, Thomas M. Royal & Co.

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Transparent bags

Transparency in packaging material is a feature which has achieved great success for many packages and products. From its introduction this quality proved valuable. It is true that in some cases visibility may not be desirable but for the most part it is an asset. Certainly the transparent bag has an enviable utility record to its credit.

The growth of the use of transparent materials and the reduction in cost of producing such materials during the past decade have been most significant developments in the history of packaging. Endless possibilities have been opened up for the packaging of thousands of products heretofore sold in bulk.

Before the war, greatest emphasis was on the use of this material for its merchandising advantage of eye appeal. Now, and for the duration, its most important characteristic is its protective quality. Transparent materials for purely display purposes have been completely limited by government orders for the present time at least. However it is evident that their uses for essential packaging have been increased manyfold as alternates for metal and other now scarce materials.

Aside from these restrictive measures there are practically no limitations on the applications for transparent bags except those set by the size, shape, weight, fluidity or other characteristics of the product to be packaged.

Among the most commonly used materials for transparent bags is cellophane. This completely transparent sheeting is lustrous, durable, flexible and impervious to air, grease and dirt. Bags made of this material and the characteristics of each are as follows:

Plain transparent (P.T.)—Products not affected by moisture may be packaged in plain transparent cellophane bags, usually designated as P.T. Such products include in normal times a long list of fruits and vegetables, candies, apparel accessories, dry goods, soaps, stationery.

Moistureproof transparent (M.T.)—All products that should retain moisture or be protected from atmospheric conditions, require the protection of moistureproof cellophane bags, designated as M.T. Such products include perishable foods, Army rations and medical supplies, metal items that are subject to corrosion, etc.

Moistureproof heat sealing (M.S.T.)—Bags made of cellophane with heat-sealing qualities inherent in the sheet. This material can be sealed to itself without the use of adhesives by the application of heat.

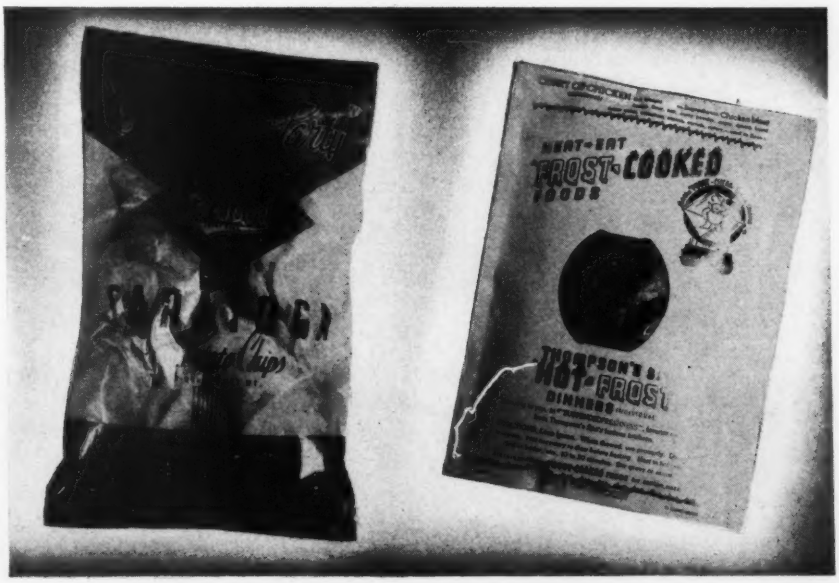
Moistureproof heat sealing, anchored (M.S.A.T.)—Cellophane bags made of material designated M.S.A.T. provide greater moisture protection than those made of M.S.T. cellophane. This material is designated as "anchored" because of the process by which the coating is applied. It is used widely for frozen food bags.

Color—Cellophane bags are available in eight colors: red, green, blue, pink, orange, amber, orchid and violet.

Printing—Transparent cellophane bags may be printed by letterpress, aniline, or gravure, in one to six colors, by means of type setups, zincs, halftones, or process plates. (One company prints seven colors by gravure).

Either the inside or outside of the walls of the bag may be printed. Printing on the inside of the film known as reverse printing is used when a brilliant effect is desired and when there is no possibility of the printing inks affecting the packaged commodity. Duplex bags are usually printed in reverse on the inside of the outer wall.

(Continued on next page)



1—Effective use of semi-transparent film which is now doing duty for war-scarce materials. The function of these bags is, of course, primarily protection. But material used is definitely a sales asset in that it contributes visibility to the package also. Photo, Thomas M. Royal & Co.

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Construction of bags

Cellophane bags are made in three standard styles: flat, square and satchel bottom.

Single or double wall—All three of these bag types may be obtained in either single or double wall (duplex) construction. Duplex bags are used for extra protection against shipping or handling hazards and where weight or bulk of the packaged commodity necessitates greater container strength. Specific protection requirements are met by fabricating the inside and outside walls of the bag of different films. Cellophane bags used in the Army Ration K packages, for example, are comprised of thicknesses of this transparent material.

Closures—Transparent bags may be closed by twisting, heat-sealing, crimping, stapling or with cellulose tape. Cardboard headers are often used, especially on plain bags, as part of the closure. They may carry the name and trademark of the product, and often some promotional or required informative copy. Holes may be punched in the header for hanging bags on special display racks.

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Sizes of bags

Transparent bags may be made up to order in virtually any size varying in widths from 1½ in. to 14 in. and in lengths from 3 in. to 17¾ inches.

Unprinted bags are available in stock sizes which are fairly well established throughout the industry. The numbers by which the bags are designated indicate their nominal capacity, but it is obvious that the capacity of the bag varies with the bulk of the product to be packed.

1. Flat bags—1-oz., ¼-lb., ½-lb., 1-lb., and 2-lb. sizes, as well as in a size designated as "No. 1 Peanut" and designed to hold 1 oz. of nuts
2. Square bags—same as above plus a 6-lb. size, and four special small sizes
3. Satchel bottom bags—designated as ¼-lb., ½-lb., and 1-, 2-, 3-, 4- or 5-lb

Transparent bags may be filled by hand or by machinery. Granular products, such as sugar, small confections, seeds, etc., are loaded by the use of a hopper or a funnel-loading device. Many excellent automatic weighing and loading machines have been developed.

Glassine

Because of their semi-transparent quality, due to certain treatment in fabrication, paper bags made of glassine deserve an important place in this classification.

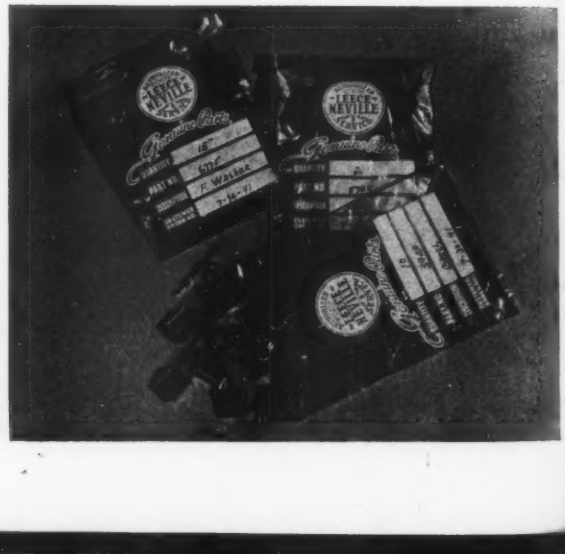
Bags of glassine are made in standard-type construction or in special types and are available in many sizes. They are used widely in many industries because of their excellent protective qualities.

Glassine bags are given their maximum degree of transparency and gloss, and their greaseproof, moistureproof, and heat-sealing characteristics by means of lacquer and wax coatings.

Many of these lacquer-coated glassine bags are used

2—Shelf life of perishables is extended by the use of cellophane which material also permits the products to speak for themselves and to assure the purchaser of freshness. 3—Pliofilm, a liquid seal, may be used to package pickles in brine. Photo Goodyear Tire & Rubber Co., Inc. 4—Small machinery parts are protected from grime and corrosion in small cellophane bags. These bags allow quick identification of product.

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extensively for the same purposes as cellophane, e.g., containers for potato chips, popcorn and small confections, which require a high degree of protection against grease and moisture.

Waxed glassine bags used as liners for cartons are a mainstay in the manufacturing of cereals and crackers.

The properties of waxed glassine are particularly suitable for these products which are likely to be exposed to a lengthy shelf life. Enclosed in a waxed glassine bag or carton liner, such products receive adequate protection against moisture, and can be depended upon to retain their crispness and freshness from the time they are packaged to the time they finally reach the home of the ultimate consumer.

Glassine takes attractive color printing in accurate register, and is strong enough to stand the strain of all stages of high-speed machine wrapping processes. It is available in several colors.

If chlorine-bleached white papers should become scarce during the coming year, it is the opinion of many that a great number of packagers will turn to bright amber-colored glassine for packaging their products.

Because of the shortage of glassine paper, however, bags of this material have been limited for the packaging of such items as hosiery, lingerie, notions, hardware, etc.

Rubber hydrochloride

The present rubber situation has cut off entirely the possibility of using rubber hydrochloride sheeting for civilian packaging purposes. The makers of this material have announced that practically the entire production is now being used for making the bags in which airplane engines are protected against corrosion through the dehydration method during shipment to war zones.

In the field of transparent packaging, however, rubber hydrochloride sheeting offers many advantages which will be in great demand once the war is over.

Some of the advantages of rubber hydrochloride sheeting are as follows:

1. It is impervious to dilute acids, air, alkali, brine, grease, normal heat and cold, moisture, mold, oil and water.
2. It is dimensionally stable throughout the entire humidity range.
3. It has great tensile strength and resists puncture.
4. It is non-explosive and not readily inflammable.
5. It takes printing easily.
6. It may be closed by heat sealing, sewing, or adhesive.

Rubber hydrochloride sheeting is made in a crystal-clear transparent type as well as in a wide range of transparent and opaque colors. It is not a coated material but homogeneous—that is, the same substance throughout. Because of this fact, heat sealing effects an actual fusion of the material and creates an air-tight bond stronger than either sheet. The moistureproof quality that keeps flavor inside and air outside, together with rapid, thorough sealing, has brought hundreds of flavor-sensitive products into the transparent packaging field. Special inks for printing the surfaces of rubber hydrochloride sheeting provide many opportunities for display.



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5—A postwar version of the transparent bag will feature the use of an ingenious pouring spout. Photo, E. I. du Pont de Nemours & Co., Inc. 6—Decorative moistureproof cellophane bags can be successfully used for many food products which require greaseproof barriers. The fine display value of these bags is obvious. Photo, Thomas M. Royal & Co.

The two most common types of bags made from rubber hydrochloride sheeting are the regulation flat and square (or gusset) forms. Open-end pouches, resembling a shortened satchel bottom of the conventional type, are used for the packaging of soft or semi-solid products such as processed cheese. The open end is usually folded and sealed to form the completed package.

Rubber hydrochloride bags, laminated or otherwise, enclosed within paper containers have proved successful for the packaging of many products, notably coffee. Laminations of rubber hydrochloride sheeting with paper and foil are also used in bag form.

XUM

Metal foil bags

by J. E. Dulaney

The use of metal foil bags in the packaging field had its beginning several years before World War II. Yet, it was during the war period that great advances were made in perfecting metal foil bags with a wide range of uses.

Metal bags are made in square and flat types (both available in the duplex style) with various supporting laminations, such as acetate, vinyl resin and available films, or the conventional paper-base stocks, which provide strong yet attractive containers.

One outstanding development to come out of war packaging research is the flexible material made from composition foil, kraft paper, asphaltic compounds, vinyl or cellulose films and thermoplastic adhesives. This material, where formed into bags by heat sealing, has been used extensively in the packaging of hygroscopic and light-sensitive goods for shipment overseas, as well as for the packaging of delicate, precision instruments and machine parts. Illustrative of some of the items packaged for overseas shipment are: ammunition, signal flares, dry batteries, drugs, radio parts, photographic film and even huge generators.

Aluminum, because of its unique properties of non-toxicity and reflectivity, in addition to opacity and near-zero moisture transmission rate, offers the most interesting possibilities in the packaging of civilian food, drugs, cosmetics and perishable goods of all kinds.

Advantages of metal foil bags

Low moisture transmission rate—This means that when the product is placed in a metal foil bag and properly sealed, the rate of moisture transmission from the outside atmosphere to the interior of the bag, or from the interior of the bag to outside atmosphere, is less than .09 per cent. This extremely low transmission rate has been ascertained by extensive tests in government laboratories, and offers countless possibilities to the manufacturer of hygroscopic or efflorescent commodities.

Opacity—Metal foil excludes light with the sure opacity of a camera shutter. This is a very important advantage to manufacturers of merchandise sensitive to light rays, as in the case of photographic film. Light rays also set up catalytic action in certain food products resulting in rancidity as, for instance, with potato chips. In this case the metal foil bag serves a double purpose in preventing moisture transmission and in providing a barrier to light. Many other commodities are similarly benefited.

Heat transmission—Aluminum has a very definite advantage over other metals in that it possesses unusual properties of heat and light reflectivity. Because of its extreme reflective surface, aluminum foil acts as an insulation barrier to heat transmission, catching the heat rays and deflecting them.

In the reflectivity of light and heat aluminum foil is considered a most efficient reflector of the infrared ray which is harmful to products affected by light.

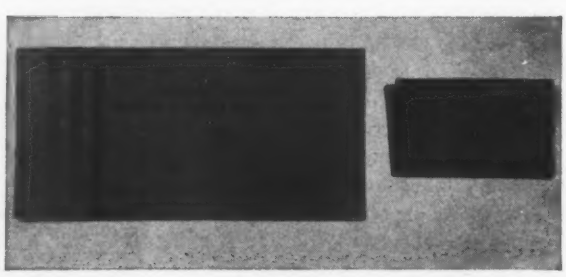
Non-toxicity—Unlike many other metals, aluminum is non-toxic and may be placed in direct contact with food products without harmful effect. While most metal bags have an inner liner of other material, this non-toxic property is an added assurance to the manufacturer that his product cannot become contaminated by possible contact with the metal, or by toxic transmission through the liner. Aluminum also provides its own protection against corrosion by quickly forming an oxide layer which inhibits further corrosion on the metal.

Retention of aroma and flavor—By forming a positive barrier to vapor transmission, both in the metal and in the seal, metal foil bags offer the maximum aromatic and flavor retention value in flexible packaging today. This is very important in the packaging of products where loss of aroma or flavor (while in storage or on the retailer's shelf) would degrade the product with consequent loss of profits to the manufacturer. By forming a satisfactory seal against the escape of aroma, metal bags also protect the product packaged from contamination by contact with foreign odors or gases. At the same time, metal foil bags are greaseproof and can be handled and displayed without fear of loss of constituent properties or the soiling of clothing or store equipment.

Flexibility—The property of flexibility offered in metal foil bags is of distinct advantage to both manufacturer and consumer. To the manufacturer it means that empty bags may be stored flat, occupying very little space, and may be filled and shipped to destination points with far greater saving in both space and weight than many other types of containers. To the consumer, a flexible metal bag offers the advantages of easy storage on shelf or in refrigerator, quick and easy access to contents and simple disposal of container after use.

From the psychological standpoint metal foil bags, particularly aluminum bags, are outstanding in eye appeal and the suggestion of quality. Opaque and transparent printing inks used in combination with the natural brilliance of the metal itself endow metal foil containers with rare display values for individual or group effects.

Two examples of laminated composition foil bags used for maximum moisture-proof packaging for combat purposes. Photo, Reynolds Metal Co.



Merchandise envelopes and packets

Occasionally, in packaging, it may appear difficult to draw a fixed line of demarcation between one category of container and another. This is somewhat true of certain flat bags and envelopes. Practically the only distinction between the flat bag and the envelope is that the ends of the latter are die-cut instead of serrated. Envelopes provide convenient units for dispensing small quantities of a variety of products. In addition to this they afford a degree of protection for their contents, and, when desirable, safeguard identities.

Items packaged

Merchandise envelopes and packets are particularly practical for packaging items such as the following:

1. Individual portions of powdered chocolate for hot drinks at soda fountains, soluble coffee
2. Small quantities of seeds, drug products, minute watch parts, phonograph needles
3. Small quantities of powdery substances, which must be completely enclosed to prevent sifting
4. Flat objects of light weight, hosiery, gloves, collars, dress patterns, notions, fishing flies
5. Samples distributed for promotional and advertising

In size they vary from tiny 4/6-in. by 1-in. envelopes with a center seam, for minute watch parts, to 7½-in. by 10½-in. envelopes of general utility.

Merchandise envelopes offer more than a convenient and economical method of packaging the products listed above. They can be made of many types of papers, transparent sheetings and laminated films and offer all the possibilities of color printing and pictorial presentations.

An interesting case of a dual purpose envelope is one used by a manufacturer of edible dyes. One side of the envelope tells the story of Easter egg coloring. When Easter is past, the other side of the envelope gives the story of food coloring for cakes, cookies, ices, etc.

Utility functions, too, are performed by merchandise envelopes. At hand is the case of a manufacturer of automobile piston rings. As any automobile mechanic knows, the proper piston ring in the correct groove when "re-ringing" an automobile engine is vitally important for maximum performance. This manufacturer used identifying colors on the edge of his envelope.

1—Individual envelopes for protecting piston rings from corrosion and mutilation. Photo, Cupples-Hesse Corp. 2—Merchandise envelopes have proven to be safe and sterile containers for medical supplies. Photo, U. S. Envelope Co. 3—A sampler packet of moth crystals, in a die-cut folder. The dramatic shape is definitely promotional. Photo, Ivers-Lee Co.

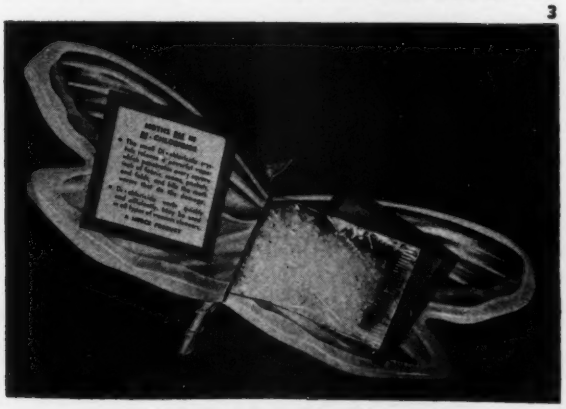
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Fabric bags (unit containers)

by J. F. Rose

Primarily, sewn fabric bags have been devised for novelties. Games, cigarette lighters and cases, vanities, jewels, watches, metal novelties, silverware, pipes, cameras, razors, toilet articles, shoe cleaners and shoe polishing articles and drug samples are among the items normally packaged in peacetime. To this list are now added numerous articles packaged for the Army and Navy—parts for defense mechanisms, medical instruments and supplies.

Normally, sewn containers have been fabricated in various textiles and materials appropriate for the product marketed. Among materials which have been found desirable for diverse purposes are: paper, cotton-wadding-lined paper, flannel of all kinds (including "anti-tarnish" flannel), duck, webbing, rayon, flannel-lined rayon, leather, leatherette, silk and transparent oiled silk.

Cotton-wadding-lined paper—Paper, of course, has played a leading role in substitution. In the case of sewn containers, however, paper—lined with cotton-wadding—was among the first materials tested. At the present time, cotton-wadding-lined paper bags are extensively employed not only for replacement of more durable and more eye catching materials (now unavailable) but also for many purposes in connection with war production.

Although some manufacturers deplore the necessity of accepting the cotton-wadding-lined container, it is perhaps the most adaptable for all functions exclusive of appearance and durability. In connection with wartime use, the cotton-wadding-lined paper bag is particularly suitable for the protection of small parts while in transit or while awaiting inspection and assembly. Later the bag may be discarded without incurring appreciable expense.

Anti-tarnish flannel—A special dye process renders flannel particularly appropriate for encasing silverware. This process reduces the amount of free sulphur (remaining in the flannel) to a minimum—free sulphur being the agent which accelerates tarnishing of silver—thus, the name, "anti-tarnish flannel." In addition to resisting undesirable tarnishing, flannel containers protect metal from disfiguring scratches which might otherwise be sustained through contact with hard surfaces. The colors which can be obtained by the anti-tarnish process are practically unlimited. Being at once durable and protective, the flannel case invites investment, from the aspect of design and eye appeal, for marketing purposes. Unfortunately at present, flannel is restricted to priority purposes, such as containers for medical instruments, or parts which require a durable wrapper.

Canton flannel and webbing—An interesting Canton flannel or webbing container has been developed for military use, which may become a fixture in peacetime packaging. Medication, such as chloroform or methyl bromide, in a sealed ampul is placed in a bag and the open end subsequently closed and sewn securely. The bag will protect the ampul from breakage until it is purposely broken. The container then becomes saturated with the liquid, permitting the desired escape of vapor but preventing the escape of harmful bits of glass.



Sewn fabric bags and unit containers are designed in a variety of convenient shapes, sizes and materials. Photo, Cottonluxe Mfg. Co.

Rayon, leatherette, transparent oiled silk, etc.—These materials are appropriate for containing novelties, cosmetics, games, shoe kits, etc., when special protection is not necessary. They lend themselves to elaborate and artistic designs. In some cases flannel linings may be used.

Aside from the temporary factor of war restrictions, the major limitation for sewn containers is the fact that they are custom made, and therefore cannot be manufactured by entirely automatic equipment. The degree of protection offered by these containers is also limited, ensuring protection only against scratching, excessive contamination by dust or undue tarnishing. The cost of the container varies according to the material specified, elaborateness of design and construction and quantity ordered—sometimes averaging as low as ¼¢ per unit.

Sizes have ranged from the small case for jewels or tiny lenses, to the container for a bomb nose.

The sewn container offers positive advantages in the following ways:

1. It obviates product depreciation due to superficial mutilation before and after purchase.
2. It may enhance the sales value of the article by lending a rich appearance.
3. It provides a convenient means for handling items which would otherwise have to be wrapped and unwrapped. This advantage, on a large scale, becomes definitely labor-saving economy.
4. It is normally available, at reasonable cost, in individual designs and in any quantities desired.

A practical value has always been ceded to the sewn container. Now that this characteristic has been so widely demonstrated, during the war period, it is not likely to be overlooked during approaching peacetime.

Textile bags

It is interesting to note that bags carry more of the world's goods than any other type of container. Among the oldest types of bags are those made of textiles.

Generally speaking, there are four kinds of textile bags —burlap, cotton, cotton or burlap in combination with paper and woven paper.

Burlap bags for strength

Burlap bags are one of the cheapest and most durable packages that can be chosen for bulk shipments of dry materials. Burlap is made from jute which is grown in India (not to be confused with the same word denoting scrap in paperboard making). Jute is the fibrous part of a plant which grows 5—15 ft. high. The fibres are located between the outer covering or bark and the stalk of the plant. To remove them from the stalk, they are immersed in water 8—80 days.

The cloth is woven in a variety of constructions and is finished in several different ways. Jute, however, is a coarser fibre than cotton and therefore does not make as uniform a product. The products of each burlap mill in India are inspected and tested each year in normal times by a representative of one of the large bag manufacturers in cooperation with other companies in the industry and quality classifications are issued dividing all jute mills of India into four groups, A, B, C and D. This grouping is based on certain factors found to be present, such as weaving defects, short yardage, wrinkled and folded ends. This mill grouping is used as a quality guide.

The weight of the burlap, the twist of the yarn and the manner of weaving are chief elements in the strength of the cloth. The size and twist of the threads and the number of threads woven in a given distance determine the weight of the cloth. Jute weavers call the threads that run the length of the cloth or warp threads, "the porter," and the threads that run at right angles or filling threads, the "shot." The number of threads per unit of measure in the "porter" and in the "shot" is called the count. The count, thus, is the factor which to a greater extent determines the strength of the cloth.

Burlap bags are used where strength is paramount and appearance is not so essential. They are ordinarily used when comparatively large amounts of a product are to be packed in one unit. Burlap bags may hold 200—225 lb., although modern practice is to use the100-lb. size which can be easily handled by one man.

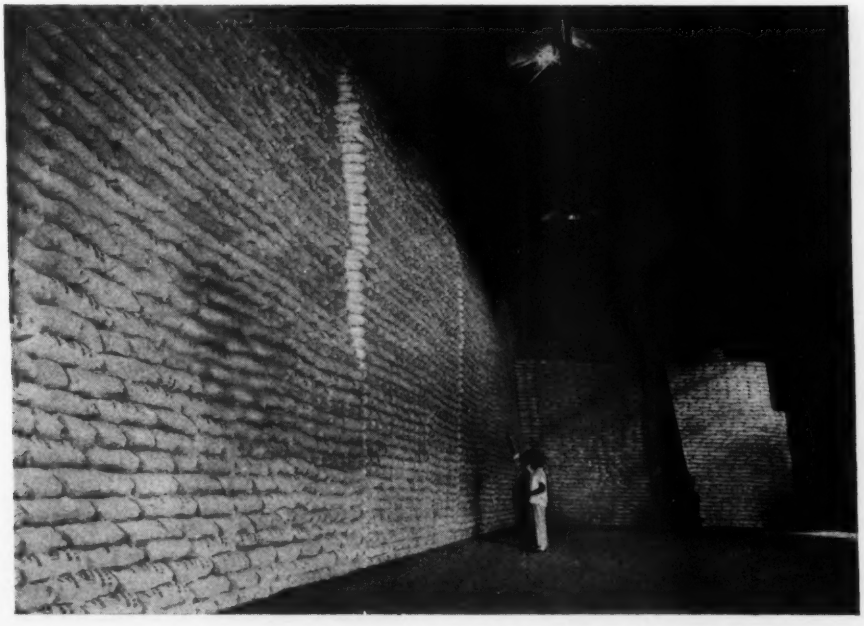
Cotton bags for appearance

Cotton bags are more generally used where appearance and cleanliness are important. Prior to 1900, cotton goods for use in bag making were produced largely in New England mills, but since that time there has been a gradual migration of these mills to Southern states.

Through research, improved equipment and increased efficiency considerable progress has been made in standardization, consistency of quality and finish of cloth.

Construction for 100-lb. cotton containers as well as liners are usually confined to a limited number of widths, such as 30, 31, 32, 36 and 40 in. in styles known as sheetings, drills and osnaburgs.

Sheeting styles—Sheetings are classified by yards per pound, such as 36 in., 4 yd. per lb.; 36 in., 2.85 yd. per



1—Where cleanliness in appearance is an important factor cotton bags are generally used. Here are stacked tons and tons of Cuban sugar in cotton textile bags. Photo Press Association.

XUM

lb.; 40 in., 2.85 yd. per pound. They are generally made with 48 warp and filling threads per in. each way. Some constructions are bleached, clay sized and calendered to provide protection for the product, to prevent sifting and to give a better appearance as well as an improved printing surface.

Drills—Herringbone-weave drills are used relatively little for containers. Sometimes, however, if a high degree of sifting protection is required, herringbone drill is used for bags of less than 100-lb. capacity. These constructions are fabricated in 30- and 36-in. widths, with warp and filling counts 70 by 48 in. and with weights of 2—3 yd. per pound.

Osnaburg—This is a coarse, heavy-duty cotton fabric made in medium and heavy weights. The heavier weights are described in ounces per yard rather than in yards per pound. The principal heavyweight constructions are 30 in. and 36 in. at 7 oz. per yd. and 40 in. at 7 and 8 oz. per yard. These are used in packaging such products as cement, chemicals, fertilizer and other heavy materials.

Lighter weight osnaburgs such as 36- and 40-in. widths at 3.50 yd. per lb., are used for containing coarse materials such as feed, salt, etc.

Seamless cotton bags—Bags of this type are made from cotton woven in the form of tubing. They are excellent for multiple-trip or heavy-duty service. They are made in 1-, 2- and 2½-bushel capacities for shipments of grain, beans, seeds, flour, sugar, etc.

Combinations for versatility

Combination bags of textiles and paper were devised by bag manufacturers to broaden the use of their containers for products which ordinarily would be unsuited to a textile bag such as calcium chloride, alum, copper sulphate, sodium, hyposulphite, dyes, paint, pigments and insecticides.

Some powdered products sift even when packed in bags made of very closely woven cloth. Other products absorb moisture or give off moisture and therefore must be given more protection from the atmosphere than can be provided by textiles alone. Other products must be kept free from contamination.

Liners

Loose liners, today, fall into two classifications—the single-stretch and the double-stretch type. Single-stretch liners have about 33 per cent stretch around the width of the bag but no stretch in length. Double-stretch liners have approximately 33 per cent stretch in both directions. The stretch feature, aside from the care exercised in insertion, filling and closing the container, has more bearing on the performance of the liner than any other item. To avoid placing strains on the liner, its minimum stretch must equal the stretch of the outer textile bag in every direction. Liners have been treated with various coatings and impregnations to incorporate into them resistance to transmission of moisture and grease.

The efficiency of the loose liner, however, is dependent on the care with which it is handled. The fit of the liner must first be most carefully determined. The way it is inserted into the outer textile bag is likewise a very important operation. This must be accomplished so there will be no strains exerted on any part of the liners when the bags are filled. Special attention must be given to the closing of the outer bags and the liners. Liners should always be closed independently of the outer bags, because any closure of the outer bags which includes the liner is likely to cause strains and breakage.

A development during the past fifteen years is the textile bag with attached or laminated paper liner. This unit has many advantages in that it can be handled as a single unit. It consists of an outer textile bag with a paper liner capable of stretching in all directions. The liner is at-



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2—One of the oldest and most popular packages, textile bags have taken war shipments of sugar and other products to all parts of the world. They are convenient and protective.

tached to the burlap or cotton with an adhesive. This type of liner is known in the trade as W.P.P.L. (waterproof paper lined).

Adhesives

Asphaltic cements are the most common type of adhesive used to bind the paper to the fabric because they are more moisture resistant than most other adhesives. Much progress has been made in the use of various types and kinds of asphalts to overcome brittleness at low temperatures and softening at high temperatures. The use of other materials with asphalt have also been found to give the results which are required under special conditions.

Rubber latex was being used as the adhesive between the outer burlap and the first paper lining before the war, but such development has been retarded due to the wartime rubber situation. Right now some extensive experiments are being conducted with the use of vinyl and other plastic resins as laminants and seam-sealing compounds which are expected to mean great progress in this field in the very near future.

The weakest points of any container in connection with waterproofing are at the seams. A recent development in bag making is the use of cemented seams instead of stitching. Means are also being provided for heat sealing the bag after it is filled to produce a highly moistureproof sealed container. Other developments utilize pressure-sensitive tapes for reinforcement of seams and closures.

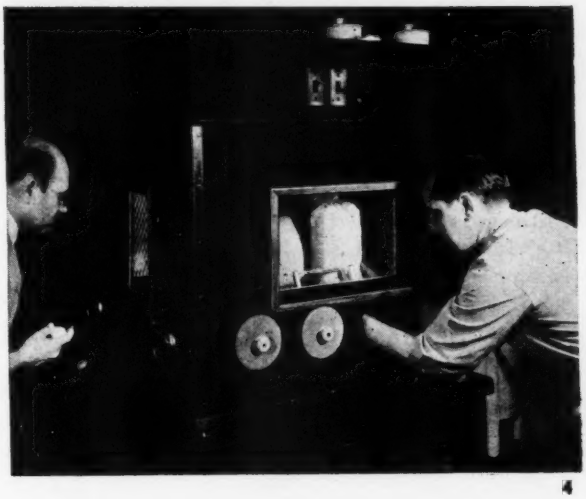
Methods of closing

The methods of closing textile bags are as follows:

1. *Machine sewing*—Machine sewing is found advantageous for volume production. After passing the filling spout the bags move by conveyor to a sewing machine through which they are hand guided. The usual stitch employed is the double-locked stitch. Four stitches per inch is common practice except in fabricating cases for finely powdered materials, where a closer stitch is more efficient. To close 100 bags 19 in. in width there are required 464 yards or 0.2303 lb. of 5-ply No. 12 thread in the needle and looper of a sewing head. This is an example of how twine closure costs may be estimated. One of the large bag manufacturers furnishes a table so that bag users may know how much sewing thread is required for any particular size of bag.
2. *Hand sewing*—Bag closing by hand sewing is generally accomplished by means of a large needle made especially for bag closing, a loop stitch over the rolled bag mouth forming ears at each end.
3. *The wire tie*—This method is also a hand operation. The mouth of the bag is gathered and twisted slightly. Then a piece of malleable wire looped at both ends is applied with a hand twisting tool.
4. *Tape sealing and heat sealing*—The use of cementing tape over the mouth of bags with attached liners made of laminated materials to effect a closure is now coming into wider usage. It may not be long before a heat-sealing operation is perfected for these types of containers.



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Textile bags must also withstand rough handling and varying shipping contingencies. 3—Tumbling box for testing bags under all sorts of shipping conditions. 4—Arctic testing box tests bags at sub-zero.

An important consideration in closing textile bags is the amount of spill room allowed. A bag does not resist severe drops or shocks unless there is some space for the load to shift. This is a feature of hand sewing to be carefully watched, since the bag sewer may not always allow for sufficient spill room. As a general rule there should be a minimum of ½ in. and preferably 1—2 in. from the level of the contents to the closure. This measurement should be taken with the bag standing on its butt and both walls of the bag brought together, pressing on the top of the contents. The closure should then be ½ in. above the point where the center of the walls of the bag meet and contact with the contents. More spill room should be allowed in a 100-lb. bag than in smaller sizes, as the stresses and strains are bound to be greater in the larger package.

Specifications for bags

Textile bags are almost always custom made for the product to be packed. Before the proper bag or bag with liner or laminations may be recommended for a new

product such factors must be determined as (1) fineness of the product (2) its flowing qualities (3) weight per cubic foot, loose or settled (4) percentage of moisture contained (5) required protection against moisture loss (6) hygroscopic or deliquescent properties (7) chemical action on fabric or paper (8) type of package now used (9) filling, weighing, closing methods (10) where and how it is shipped—rail, truck, air, steamship, etc. (11) how it is handled (12) storage conditions, etc.

Bag testing

Only when these properties of the product and handling conditions the package will undergo are known, can a bag of the proper tensile strength with the proper protective features be selected. Preliminary tests are usually conducted in the bag testing laboratory approximating all conditions of handling, storage and end use. To assure satisfactory packages it is also wise to make several actual shipping tests.

Laboratory tests for ruggedness or strength commonly assume the form of a drop test. Standard number of flat drops (landing on face of bag) are usually determined from a height of from 4 to 10 feet depending upon the service the bag must withstand. This is combined with a standard number of butt drops (landing on ends of bag) from a height of 2—5 feet. Dropping by apparatus is recommended, since dropping by hand is not likely to be sufficiently accurate for the number of test drops which may be required.

Bags may be tested for loss through sifting by weighing before and after drop tests and also by tumbling tests. Special apparatus is available for the purpose. In modern usage, bags may be submitted to severe submersion tests, temperature tests, puncture tests.

Another recent development is the treatment of textiles with mildewproofing agents to prevent deterioration of the bags in actual use. Extensive tests have been made in this field for sandbags which are so widely used by the armed forces.

A technical committee of the Textile Bag Manufacturers' Association cooperates with the government in working out specifications for all the textile and textile combination bags that are being used for hundreds of products shipped by Army, Navy and Lend-Lease. All of these bags must successfully meet rigid tests for what they are designed to carry.

Bag handling

In addition to the proper selection of textile bag, the proper handling of these containers is an essential part of their successful use. Prewar, the Association of American Railroads gave a great deal of attention and study to the subject of proper loading of textile bags. Rules have been set down for preparing cars for loading —to have them carefully cleaned, all protruding nails removed, and bolts and other sharp edges covered with pads. There are also special instructions in loading to prevent friction of bags with car walls, and to prevent shifting in transit. This method of loading, known as the Key Sack Method, was said to have reduced claims on flour shipments $250,000—$38,000 a year. Users are also cautioned against employing hooks or other loading devices definitely not suitable for this type of container.

Re-use

Textile bags are an important wartime container because of their re-use possibilities. Because of this salvage value, the manner in which they are opened is extremely important. If the tops are cut, torn, or punctured, the re-use value of these bags is likely to be zero. To open a bag tied at the top with twine it is simply necessary to cut the twine without cutting the cloth. A bag tied with a wire tie can be opened by untwisting the wire by hand. A hand-sewn bag is opened by cutting the twine and pulling it out. Bags sewn by machine can easily be opened without damage as a chain stitch is used so that if the two ends of the twine are pulled the stitches will unravel readily. In normal times second-hand bags go largely into certain definite channels, but in these times when production schedules are loaded to capacity and the supply is short of the demand careful salvaging of every bag is one of the best ways to augment the supply. An example of the re-use value of textile bags is the cotton seamless bag. This is a strong rugged container, designed for multiple-trip use. It may be used for 20—30 trips and is often employed for inter-branch shipments.

Few people consider the re-use feature of a textile bag in the same light as a premium feature like a tumbler for cheese, a cookie jar package for crackers, a fancy cake box for fruit cake. Nevertheless it is estimated that 3,000,000 women and children are wearing clothes made from flour and feed bags. Such bags are made from gingham which the manufacturer has had printed with dress patterns. His trademark washes off, so that no one who sees a dress made from such material could tell that it was made from a feed bag. Two or three of these 39- by 42-in. feed bags provide enough material to make a dress for the most stylish stout. In 1941 bag manufacturers were turning out approximately 50,000,000 of these bags.

Open-mesh bags for visibility

Another type of textile bag that should be mentioned is the open-mesh bag, made from strips of tough paper spun into yarn and woven into open-mesh cloth. These bags were used extensively for shipping fruits and vegetables and their use has increased greatly due to the shortage of boxes and crates. They are made in various colors to contrast or harmonize with the contents. They are available in both bulk and consumer sizes. Their appeal is the visibility given to the product and the color they add to displays in stores.

Because of their low cost, their space and weight saving, their ease in filling and closing, textile bags will continue to gain in application both now and after the war. The new developments including such features as stronger bags made in combination with plastic materials, wet-strength papers, waterproof tapes and other advancements, will produce bags which will be preferred on a large number of counts, particularly in the heavy-duty field for chemicals, agricultural and building materials.

Heavy duty multiwall bags

Back in the Gay Nineties, Adelmer M. Bates was a salt salesman. He could sell more salt than his firm could pack. Due to this circumstance he became the father of the multiwall bag.

In 1942, about 1,000,000,000 of these containers were shipped to American industries for the packaging of approximately 300 different commodities. Many times they can double for steel and fabric. They are surviving the hazards of wartime transportation. They can even be loaded with molten compounds at 450° Fahrenheit.

Bates' inventions, patented in 1898, have turned out to be the familiar valve bag of today and the machinery designed to fill it. Shortly after his inventions Bates' company was filling salt bags so fast, the commercial world began to take notice and more and more packers cast their eyes enviously at paper bags as a solution for mass production in their various industries.

But these early bags were not multiwall bags. They were single wall, made of salvaged rope stock from ships and docks and construction jobs. They were used widely for flour, cement, plaster, lime and other building materials. Such containers were about the only kind of heavy-duty paper bag used before World War I. At that time the shortage of shipping cut off supplies of hemp and salvage rope became scarce. Bag makers began experimenting with kraft mixed with rope fibres, sisal and jute. Eventually they made bags entirely of No. 1 kraft.

Development of multiwall bags

Heavy kraft sheets were not flexible. Further experiment showed that two walls or plies of lighter weight kraft sheets combined with corn, tapioca or potato paste made a duplex bag—stronger and with greater flexibility. Soon the advantages of more plies were apparent, but not until further development of machinery for making bags of more than two plies did the development get into its present stride. This happened about 1925. Until that time all of these bags were pasted satchel-bottom type. Then a method of sewing the ends was discovered which made it possible to combine a number of sheets.

This was the real beginning of the multiwall paper bag as it is known today with the many combinations of sheets to meet each specific requirement of the more than 300 products packaged. Since 1935, the numbers of these bags used has tripled and the list of products includes chemicals, building materials, foods, animal feeds, drugs fertilizers, seeds, fuel, explosives, cleaning compounds and many others.

The modern multiwall bag is usually made with from three to six walls of kraft paper, depending upon the weight, density and physical characteristics of the product they are intended to carry. There is a possibility they may be made up to eight plies in the future. Each ply is arranged in tube form, one within the other, so that each bears its share of the burden. Greater flexibility and strength are obtained by using several walls in relatively light basis weights rather than one wall of heavy paper. A further advantage to the user is lower cost. In the case of the multiwall bag, each ply can be treated specifically to meet its requirement, whereas if a single-wall bag were used, the entire sheet would have to be treated for each requirement. It is less expensive to color, say, a 50-lb. outer sheet, moistureproof a 40-lb. inner ply, treat another 40-lb. ply for wet strength than to process a 130-lb. basis weight single-wall sheet to meet all three requirements. Adding color to the heavy sheet, alone, would cost nearly four times as much as it would cost if required to color a 50-lb. sheet.

The average heavy-duty multiwall bag is constructed usually of several sheets each 40—70 lb. basis weight (reckoned by weight of 500 sheets 24 in. by 36 in.). The most frequently used paper sheets are in the 40- to 50-lb. basis weights.

Custom made

The multiwall bag is custom made. Size and construction cannot be made up in stock items because each product packaged has different requirements. Size depends upon the weight per cubic foot of the product to be packaged. A 100 lb. of cement, for example, is not comparable with a 100 lb. of flour. Construction depends upon the physical and chemical characteristics of the product and on the circumstances of shipment and use. Some products must be protected from loss of moisture in the product; others must be provided with barriers to keep moisture from being transmitted into the bag. Some products must be packed in a bag that can withstand high temperatures. Others must be provided with walls that will not crack at low temperatures. Sometimes all of these requirements and more must be incorporated in the construction of a bag for just one product.

Before suppliers of multiwall bags recommend a bag suitable for a particular product, it is helpful for them to have such data as the following:

1. Name of the product
2. Characteristics of the product to be packed
   a) Fineness
   b) Flowing qualities
   c) Weight per cubic foot (1) loose (2) settled
   d) Temperature when packed (if hot liquid, the cold flow properties of solid)
   e) Percentage of moisture
   f) Required protection against moisture loss such as is likely in normal atmospheric conditions.
   g) Hygroscopic or deliquescent properties
   h) Chemical action on paper
   i) Poisonous or dangerous qualities

(Continued on next page)

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The multiwall bag is custom made. Size and construction cannot be made up in stock items because each product packaged has a different set of requirements. Three distinct types of these custom-made bags are illustrated above. 1—Six-ply multiwall bag. 2—Pasted valve bag. 3—Sewn valve bag.

3. Present package used (a) type (b) cost (c) weight per unit (d) protective liners, coatings, etc.
4. Present filling, weighing and closing method
5. Seasonal or year-round production
6. Type of shipments in general use: carload, LCL, truck, barge, export, air, or any other
7. Conditions of handling
8. Value per unit of product (lb. or ton)
9. End use of product
10. Special storage conditions

Such data help to furnish a background to the technical department of a multiwall bag manufacturing concern for its work on the development of a satisfactory bag and packaging equipment. Usually, technicians and engineers work right in the plant of a prospective user to get a complete picture of a particular problem and to make tests of bags under actual conditions of use. Only after that, are they ready to suggest size, construction, closing, sealing and filling methods. From such study, they may determine which of the dozens of different sheets used for the plies will give the best performance. They can recommend what special treatments, finishes, coatings and impregnations are required for these plies in order to provide:

1. Waterproofness
2. Moistureproofness and vaporproofness
3. Greaseproofness
4. Resistance to chemical action
5. Resistance to temperatures
6. Resistance to gases and smoke
7. Resistance to abrasion
8. Resistance to infestation
9. Resistance to sifting
10. Protection against mildew and bacteria
11. Easy emptying
12. Resistance to scuffing

One or two examples will show how paper bags have been successfully developed to solve the most difficult packaging problems.

Several years ago, a multiwall bag supplier was asked to design an economical, one-trip container for calcium chloride to replace steel drums because the latter were expensive, bulky to store and required extra bookkeeping.

Calcium chloride must be delivered dry and free flowing. It must be packaged at 205° F. It is so hygroscopic that moderate moisture cakes it; so deliquescent that excessive moisture sends it into solution. To meet these requirements, a five-ply bag was developed which does the job so successfully it is used more or less as a yardstick for comparing packaging problems with similar characteristics in greater or lesser degree. Three of the plies are kraft and the two inner ones are a special asphalt laminated sheet highly resistant to air-borne moisture and to capillary action.

The usual package for asphalt had been clay-coated steel drums. These take a great deal of metal and cannot be re-used because they have to be destroyed to remove the solidified asphalt. Packaged at temperatures up to 450° F., molten asphalt calls for a container that will resist this heat and, at the same time, have the necessary strength to cope with its cold flow characteristics.

Molten asphalt is now being successfully packaged in a multiwall paper bag. A liner of natural kraft paper coated with a special clay and casein formula is performing this service. This coating will stand temperatures of more than 450° F. and prevents the penetration of molten asphalt into the paper. The liner prevents the asphalt from sticking to the paper after it has cooled.

A brief description of specially treated sheets in gen-

eral use for the plies of multiwall bags will give some idea of the types of materials that impart protective and tensile properties to finished multiwall bags.

Types of plies

Laminated kraft papers—Two lightweight kraft papers laminated with a continuous film of asphalt have exceptionally high water and moisture resistance qualities and are the best all-round moisture-resistant paper at relatively low cost. The melting point is approximately 170° F. Asphalt can be obtained in higher melting points where absolutely necessary. However, such sheets are inclined to become brittle, particularly when they are exposed to cold temperatures.

High-sized and moderately high-finished papers—These are available as outside walls, particularly on fertilizer bags. They stand rain well. Tub-sized sheets are made for outside walls for application where scuffing is apt to cause heavy breakage. Wet-strength sheets are specially treated to provide higher scuff and abrasion resistance, and are used as inner plies in bags for products packed wet to prevent the disintegration of paper. A good example of this use is the multiwall bag for potatoes.

Crepe kraft—Crepe kraft is used in the tape of sewn-end bags and for tuck-in sleeve valves. In some instances, it also has an advantage as one or more plies in the body of the bag.

Wax papers—These are treated with both paraffin and micro-crystalline waxes and are used to give moisture resistance. These sheets have a wide range of temperature resistance, but should be used only within limits recommended as the result of careful testing.

Kraft paper, treated by immersion into an asphalt-wax combination—Kraft paper treated thus is not as moisture resistant as the asphalt-laminated paper. It transmits more moisture, but it also transmits less than regular untreated papers. Such a paper may also be treated to resist the penetration of grease.

Glassine—Glassine is used as an inner liner to resist penetration of oils or greases that might ordinarily be absorbed from the bag contents by natural kraft and similar papers. Sometimes two glassine sheets are laminated together with a wax base adhesive for this purpose.



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4—Multiwall bags are delivered conveniently in flat bundles. In this way, quantity handling and storage are easy. Photo, St. Regis Paper Co.

Such a sheet is used as a liner in bags for such products as sweeping compounds. It also has high moistureproof qualities, but very hygroscopic materials such as calcium chloride will dehydrate the glassine and cause it to shrink and become very brittle.

Cellophane, pliofilm, metal foil and parchments—These are also used for special protective purposes and in the construction of multiwall bags are usually laminated to one of the plies, depending upon the requirements.

Arrangement of plies from inside to outside is usually determined by the requirements of the product and combinations may be in any order which will do the job best.

Generally speaking, heavy-duty multiwall bags are made in sizes to contain 25—100 lb. The latter figure is about the largest quantity that can be carried. Linear measurements usually start at about 10 by 25 in. and increase to 20 by 50 in. with ½-in. variations in length or width. Often density of product necessitates such variation. Fox example, lime bags of the same weight capacity may be 17 by 29 in. or 20 by 40 in. depending upon the density of the product, because some lime compounds are more dense than others. *(Continued on next page)*

5—The valve bag is factory closed except for one small opening. Note the inner sleeve in sewn valve bag illustrated. 6—Pressure of the contents automatically flattens and closes the valve. 7—The inner sleeve is folded. 8—Bag with valve and sleeve both closed. Photos, St. Regis Paper Co.

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9—*This large shipping bag, intended to replace the corrugated carton, holds twelve 1-lb. bags of coffee packed by Standard Brands, Inc.*

Adhesives used between the plies are mostly of vegetable origin, although animal glues are occasionally used. Latex, before the war, was one of the best waterproof adhesives for this purpose. Reclaimed rubber glue has proved a satisfactory replacement for latex.

General types of multiwall bags

The valve bag—The top and bottom of the valve bag are closed either by sewing or by pasting and one small opening is left in one corner. This valve serves to admit the material into the bag. The valve closes automatically and instantly because of the internal pressure of the contents of the bag as soon as it is filled and dumped on the floor, slide or conveyor belt. To insure against moisture penetration and sifting, and to give added protection against penetration of micro-organisms, the valve of the multiwall paper bag may be equipped with a "tuck-in" sleeve which is tucked into the valve as soon as the filling is terminated. Today, ends are often dipped for further protection of contents.

Open-mouth bags—Open-mouth bags are factory closed only at one end; the other end is left open. This type of bag is usually filled from a hopper. The bag is held in position manually or by a bag-holding clamp which is designed for this purpose.

Open-corner bags—These are sewed-bottom bags. The open mouth is partly closed by sewing, an intermediate variety between open-mouth and valve-type bag. Open-corner bags are often used for packaging commodities which are liquid when poured hot into the bag, but which harden as the product cools. This type of bag is closed by stapling the open corner while the product in the package is still in a hot and liquid state.

Packing and closing

Multiwall valve paper bag packing machines are of four basic types: screw, belt, impeller and gravity—so called because these are the methods by which the materials are propelled through the filling tube and into the bags. Adjustments and variations of these four types have been developed for more than 100 products. Number and size of filling tubes vary with required production. Machines are adjustable for various bag sizes. Products may be pre-weighed or filled and weighed simultaneously.

Open-mouth bags are closed by sewing, wire tie, staple or gummed tape. The sewn type closure can be accomplished automatically with sewing equipment which applies a bound-over tape and filter cord and penetrates all plies of the bag. The wire tie is efficient for applications where the number of units packed does not warrant installation of automatic equipment. A hand-twisting tool constitutes the entire equipment for effecting a securely tied closure around the neck of the bag. Stapling can be done by hand or with automatic equipment. This type of closure is used for bags containing such products as potatoes, coal and asphalt. Gummed-tape closure is accomplished by folding the plies of the bag and sealing the final fold with gummed tape. The most common use for this technique is in smaller sizes.

Due to the shortage of fabrics and metal, many packers have turned to the multiwall bag to supply their needs for containers. Companies who have used fabric bags previously, can adapt existing bag-closing equipment to handle paper bags with very slight changes in most cases and with a minimum of critical material. Bag packers, sewing machines and wire ties required for the conversion from critical containers to less critical containers are available for use.

Multiwall paper bags for AN and Government use

At the beginning of the war, the multiwall paper bag industry was called upon to study the overseas shipping problems and develop multiwall paper bags which would protect products being shipped against the numerous and unusual hazards encountered, such as tropical heat, subarctic cold, submersion and exposure to the elements. After tests were made, multiwall paper bag specifications were written and include such special construction features as the use of:

1. Multiwall specification kraft paper, insuring strength and preventing contamination or infestation of the product from outside sources
2. High wet-strength papers which will not disintegrate when subjected to submersion in water for a period of 24 hours
3. Moisture-resistant papers to prevent the penetration of moisture-vapor

4. Greaseproof papers to prevent the penetration of grease through the plies of the paper bag
5. Special sheets designed to resist chemical actions, offering (1) protection against disintegration of the paper by chemical action of the product packed, or (2) protecting the chemical content of bag from destructive action from outside elements
6. Sealing compound-dipped ends to prevent the penetration of water or moisture-vapor through the sewn ends of the bag

The following multiwall paper bag specifications are in effect with the United States Army, United States Navy and Government agencies for overseas shipment.

1. The U. S. Treasury Department Procurement Division specification covering the export shipment of chemicals
2. The U. S. Treasury Department Procurement Division specification covering the domestic shipment of chemicals
3. The U. S. Navy Bureau of Supplies and Accounts specification 53S4 for overseas shipments of inorganic chemicals
4. The U. S. Navy Bureau of Supplies and Accounts specification 53S5 for domestic shipments of inorganic chemicals
5. 1766-A for the War Food Administration covering the export shipment of certain food and agricultural products
6. O.Q.M.G. 103-A, for the U. S. Army Quartermaster Corps covering the exportation of certain subsistence items into combat areas
7. 27-B-17 (INT). This is a set of specifications similar to Army's O.Q.M.G. 103-A. It is being adopted by the U. S. Army Bureau of Supplies and Accounts for shipments of flour, sugar, salt, rice, peas, beans and dehydrated soup products such as green pea and bean soups
8. 53B9e, for the U. S. Navy Bureau of Yards and Docks covering the domestic and export shipment of cement in five types of multiwall bags, depending upon the service and destination
9. The Rubber Reserve Company specification of December 1, 1944 for both domestic and export shipments of GR-S
10. The Rubber Reserve Company's specifications of June 1, 1944 covering bags for domestic and export shipment of GR-M (neoprene)
11. UU-S-48, for the Bureau of Standards describing types of paper shipping sacks, and setting up minimum test standards for the papers to be used in their construction
12. Joint U. S. Army and Navy general specifications covering many types of containers including multiwall paper bags
13. U. S. Marine Corps specifications for overseas shipments of cement

Future of multiwall bags

Multiwall bag manufacturers say few industries that have ever used multiwall bags go back to other containers. The efficiency, easy handling, small-space storage requirements of these bags give them distinct advantages. However, in the postwar era, competition will be keen among all package suppliers to retain gains made during the period 1935—1941.

But the majority of multiwall bag manufacturers do not consider their gains entirely a wartime condition. During the past three years, production has been increased some, but the trend has been toward a level of about 1,000,000,000 multiwall bags a year. This leveling off is attributed to a falling off of civilian construction and building activity, which in normal times requires many products packaged in bags. Bag production is now being used for military purposes and for replacements of containers not currently available. Although the number of bags produced in 1941 was substantially the same as in 1942, about 50 per cent of the 300 products now in multiwall bags are new uses. If these new users continue to buy bags after the war and if more bags are required for materials supplied to the building trades, then bag production is bound to continue at a high level—even when military uses are curtailed. Newcomers are also entering this field of packaging. For example, blocks of synthetic rubber are being placed in multiwall bags. And this is only one of the many new products which, more than likely, will find an important place in the packaging picture now and after the war.

10—In one package, the Courtman Chemical Co. provides the gardener with means to keep pests under control and plants in the best of health.

10



XUM

Bag sealing and closing

by E. G. Kuhn

One of the features characteristic of a bag is that, like a bottle, it has only one opening. Therefore, if the walls of a bag are sufficiently strong for the intended purpose and its seams sufficiently tight, it will afford adequate protection to the product, subject only to one consideration—namely, the effectiveness of its seal. If the seal is weak, it will not matter whether or not the bag was strong. If the seal is difficult to open, the consumer will find little satisfaction in the other good points of the bag. If the seal is difficult to reclose and the product is one which is not consumed in a single serving, consumer dissatisfaction can well be anticipated.

Because the bag closure is so vital to the proper functioning of the bag as a container, bag manufacturers, machinery manufacturers and packagers have worked hand in hand to develop closures which would solve the difficult problems confronting various packagers. Ingenious structures are today available providing closures fully adequate to meet virtually every problem. High-speed machinery is available to form and apply them.

Bag construction, material and equipment will vary in almost every separate case which might be considered. It is therefore the purpose in the paragraphs which follow to present only a brief outline of some of the more widely used seals or closures employed on the modern retail or consumer sizes of bags.

It can be assumed in reference to each type of seal that maximum packaging economy, as well as standardized effect, is possible only through the use of the equipment which in almost every case has been developed concurrently with the introduction of the seal, or later as a means of adapting it to modern production requirements.

The Allison closure—Seals contents with a triple fold which is further reinforced by a strip of gummed tape. Folds are pressed firmly against contents while tape is rolled down bag sides. Offers good protection.

The Betner seal—Employs a tin tie strip which is attached in an exposed position to the bag top by a machine which completes the regular over-and-over fold operation and then folds in a metal tie. This type offers good resealing advantages.

The Delta seal—Folds bag top to produce oblique overimposed folds and in manner which when cut according to instruction produces a pouring spout for contents. The top of the bag when sealed presents a flat surface well adapted for stacking.

The Sealtite closure—A simple and extremely practical over-and-over fold which produces a compact, flat-topped package with excellent merchandising appeal. Adaptable for intuck or gusseted bags of paper, cellophane or foil, a tight, siftproof closure is claimed when this type is used.

The seal-tie closure—A modified use of the metal strip here preserves the resealing advantages, but confines the use of this feature to the secondary closing of the bag. The primary seal consists of an over-and-over fold securely pasted flat against the top, effecting a compact package with good display value.

The square-top or flat closure—A method known as the Hesser, which has been popular in the past, uses a card which is placed inside the bag in most cases. The bag top is folded down and sealed by gluing with a top label (not gummed) glued on in addition. This type may be varied in at least two ways. For easy sifting products like sugar, the gluing is done in a different way and sometimes the top label is left off. Then the outer wrapper is die cut, folded and glued top and bottom in a manner suggesting a band label which extends around the face of the bag.

The tin tie closure—Supplements standard bag construction with a paper-covered strip of metal, which patented feature is licensed to various bag manufacturers on a royalty basis. Offers excellent resealing advantages at some sacrifice of absolute protection of contents. Wide

1—*Allison closure*



2—*Tin tie closure*



3—*Delta seal closure*

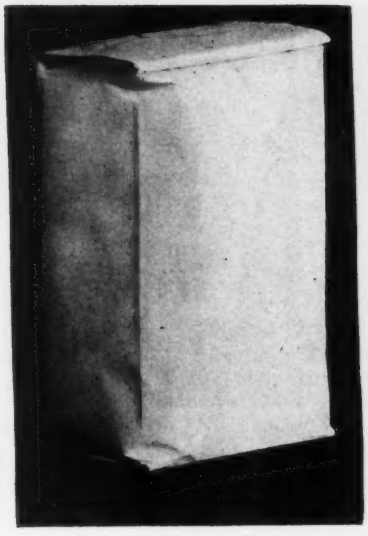


4—*Sealtite closure*





5



6



7

5—Tied closure
6—Pasted closure
7—Double fold closure

variation of finished package effects obtainable. Automatic machinery has now been developed for applying this closure, though for many products, notably coffee, the hand-tying method is still extensively used.

The wire staple—An economical and, in certain instances, an entirely acceptable closure for both paper and cellophane bags. Classified as tamperproof, although offering little resistance to moisture.

The Bagpak cushion-stitch closure—Used only on paper bags of the multiwall type. This requires a machine to apply and, in combination with a machine-sewed snake stitch, this closure is stronger than the walls of the bag. Kraft tape is applied over the stitching, thus sealing the needle holes, making a tight, siftproof closure.

The Arenco closure—Adapted for coffee, sugar, salt, etc. This method applies by machine a paper tape over the top of the bag and effects a tight, siftproof seal.

The Amsco double fold—A method of folding the tops of flat-type bags in reverse directions, sealing by glue or heat, resulting in a siftproof package which may be opened without tearing the bag.

Another method of mechanical fold, developed by the same company, folds the top of the bag twice in the same direction, applying the necessary adhesive before completing the second fold. The bag need not be torn when opening, and may be re-used.

Each type of seal illustrated and described has certain advantages which should be taken into careful consideration not so much on the basis of general merit, but rather from the standpoint of meeting the particular requirements presented by the product itself, the market it serves, competitive packaging and similar vital factors.

Alternate materials

Shortages of metal for ties and staples have brought about many ingenious developments of closures without metal. Several methods have been devised for using a heavy paper header which forms a closure the same as a metal one. This has been used successfully on coffee packages, as has another method of folding and crimping developed by A & P. There has also been progress in the development of weatherproof adhesives for seals and adhesives compounded from non-critical materials.

Heat-sealing processes

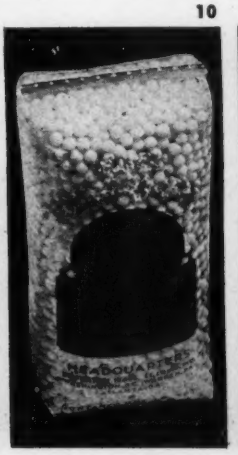
The use of bags formed of transparent cellulose or acetate sheeting, rubber hydrochloride sheeting and similar heat-sealing films has brought about a rapid develop-



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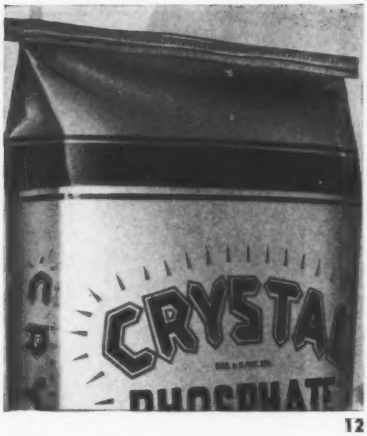
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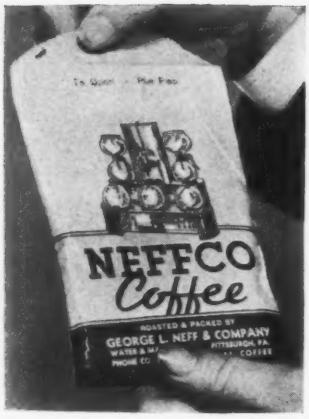
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8—Hesser closure foil
9—Square top or flat closure
10—Metal clip closure
11—Wire staple closure

XUM



12



13



14

12—Bagpak cushion stitch closure
13—Amsco double fold closure
14—Arenco closure

ment of heat-sealing closures and methods of applying these. The simplest of the heat-sealed bags is the pillow type formed from a tube of transparent sheet and crimped at either end between hot plates to achieve a seam. Transparent bags are also made in the flat, square and satchel-bottom shapes and all may be heat sealed for closure. Two general types of heat-sealing equipment are available. One locks the bag ends between heated jaws. The second heat-sealing unit passes the bag through one or more pairs of heated rollers.

Heat sealing may also be applied to waxed papers, waxed paper bags, waxed glassine bags or bags treated with some type of thermoplastic adhesive.

Machinery and equipment for heat sealing has kept pace with the development of bag-closing methods. In at least one case the rotary principle is combined with preheater and conveyor to effect either a plain seal or to provide for one or two folds before sealing. Combination of glue and heat sealing is also possible.

In some cases, excess air must be extracted before forming the seal. Machines are available to perform that operation, likewise to displace air with carbon dioxide. These refinements in bag closing have come in response to wartime packaging of metal parts and as space-savers.

15—Machine sewing of textile bags is desirable when production volume is large. Such standard semi-automatic machines as this are available.

15



Methods of bag closing

With the exception of the stapled bag—and this, too, may be closed by automatic instead of hand equipment—all of the closures shown require machine units for sealing. Such units for folding and sealing are usually integral with or included as a part of the weighing equipment customarily used.

In closing of the larger size bags, there is a definite advantage, provided, of course, that production conditions are equal, in machine versus hand closing of bags. According to actual figures, obtained at one plant where both operations were used, the cost of machine sewing is approximately one-third that of hand sewing.

In general, the consideration of bag closures is of equal importance with that of the material from which the bags are made and their construction. It is essential, then, that manufacturers of bag closures and machines for forming them be freely consulted.

Bags sealed at the factory for today's export shipments must be judged by much more severe standards than would be applied to the ordinary bag used for domestic distribution or to the manufacturer-shipped bag carrying a single unit of merchandise. When powdered or granular material is bag packed or when essential weatherproof properties are required, closures become all-important.

In considering closed bags of these types, the following may be taken as checking points: (1) secure closure (2) reclosability (3) siftproofness (4) convenience in stacking (5) convenience in packing (6) cost and availability of necessary equipment.

Checking against these points, one type of closure may be indicated in one instance and another logically chosen for a different product and different marketing or manufacturing conditions. For further information on this subject see *Heat Sealing Principles*, p. 348; *Heat Sealing Equipment*, p. 662; *Bag Filling and Sealing*, p. 671.

ADVERTISING FOR...

BAG AND ENVELOPES



50 YEARS

1895 1945

Fifty years ago when Thomas M Royal started this company, paper bags were just paper bags - and not much at that. Today beautiful bags and packages are made for nearly everything - from almost anything ... new materials, new coatings, new laminations, new methods of combining. Royal Flav-O-Tainers are a notable example of this modern trend.
Our laboratory is working night and day testing all these new materials as they appear. The benefit of their experience is available for you for the asking.

Diapers and Dynamite, Prunes and Toilet Tissues, Baked Beans and Bandages, Soup Mixes and Dog Foods, Chemicals and Flour, Tobacco and Bread Crumbs, Dehydrated Vegetables, Frozen Foods, Army Rations, Coffee, Tea, Spices, Machine Parts--all these and many more are packed in paper bags today.

Under the heading of materials used in bag making today, we have Bond, Kraft, Parchment, Glassine, and Sulphite Papers, also Cellophane, Pliofilm, and Aluminum Foil.



BRYN MAWR



BEAUMONT



THOMAS M ROYAL & COMPANY

PHILADELPHIA 20

OFFICES IN PRINCIPAL CITIES

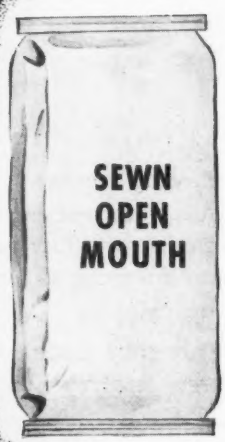
Consult a Specialist!

We make HEAVY DUTY MULTIWALL PAPER BAGS *only*

Millions of them — all four types:

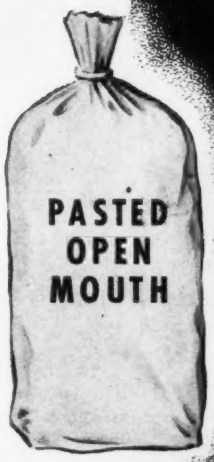
For

Units Ranging from 25 to 100 lbs.



1. Sewn Open Mouth
2. Pasted Open Mouth
3. Sewn Valve
4. Pasted Valve

Our bag plant's main objective is—perfection in the manufacture of these containers. Therefore, when you buy from international you can be certain that we will supply the proper type of bag for your particular requirements.



INTERNATIONAL PAPER PRODUCTS DIVISION



International Paper Company

220 East 42nd St. New York 17, N. Y.

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BALTIMORE, PHILADELPHIA, ATLANTA,
ST. LOUIS



AGENTS FOR

BAGPAK, *Incorporated*

George & Sherrard Paper Co.



* *Trade Mark reg. U. S. Pat. Off.*





George & Sherrard Paper Co.

ONE MAN PACKAGE — EASY TO HANDLE

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UNDERWEAR IS IMPORTANT IN PACKAGING, TOO . . .

Today's foods are *completely* dressed, even to underwear. Consider Betner's liners, for example, worn "next to the skin" of America's *finest* foods!

BETNER'S LINERS

1. Suitable for any hygroscopic food
2. Thermosealed with minimum equipment
3. Prevent leakage, seepage
4. Prevent flavor loss
5. Moisture- vapor-proof
6. Low in cost

Best proof of Betner quality is the list of processors who use Betner service. For some we supply the complete package . . . inner and outer bags. For others, liners only. Betner's is a complete *bag* service . . . we turned out over 4 *billion* bags last year. And every bag—you could choose any, at random—would be proof of the painstaking care with which we operate.

Why not entrust us with your packaging problem? Our designers and research technicians will willingly study your requirements, offer suggestions which will obligate you in no way. Our main office is in Devon, Pa., and we're at your service the moment a letter or phone call reaches us.

Benj C Betner Co

DEVON, PA.



Year after Year...

47 years is a large sector of time. Yet, that's how long (since 1898) that Neostyle has served concerns such as Hershey Chocolate Corporation. For fourteen of these years we have served Hershey Chocolate Corporation. In peace or war we make millions upon millions of plain and printed bags and envelopes for these famous chocolate products. This long, uninterrupted period of service is indicative, we believe, of the capacity, quality and dependability of the bag and envelope service we give. If your products are packaged in plain or beautifully printed bags, envelopes or wraps, for service or civilian use, we suggest discussion of your problems with our packaging engineers.



Neostyle INC.
ESTABLISHED 1898

PRINTED BAGS
ENVELOPES WRAPS

SPECIAL ORDNANCE
PACKAGING MATERIALS

410 NORTH WABASH AVENUE, CHICAGO 11, ILLINOIS

MEMBER OF INDUSTRIAL PACKAGING ENGINEERS ASSOCIATION OF AMERICA

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LUMARITH*
A Celanese® Plastic
For Windows
CELANESE PLASTICS CORPORATION
180 Madison Ave., New York 16, N. Y.
A Division of Celanese Corporation of America
LUMARITH* C.A.
Cellulose Acetate
LUMARITH* X
High Acetyl Cellulose Acetate
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CELLULOID*
Cellulose Nitrate
SET UP BOXES

FILMS and FOILS

PROTECTION WITH SALES APPEAL

Lumarith plastic packaging films and foils make it possible to combine glamour and sales-appeal with scientific protection of contents. Lumarith plastic films and foils differ both chemically and physically from ordinary transparent films made from regenerated cellulose.

DOES NOT DRY OUT

Lumarith does not dry out or become brittle with age. It is the most dimensionally stable of all packaging films. Windows made of Lumarith retain their sparkling transparency and flatness—in the hot display case or the deep freeze cabinet.

GERM, MOLD and FUNGI PROOF

Lumarith films and foils are proof against infestation. They will not support parasitic life.

WATERPROOF, GREASEPROOF

Will not soften in water or grease. Lumarith even holds chicken fat—one of the most penetrating greases.

PRINTING

The surface of Lumarith is ideal for multi-color printing. Its crystal clarity permits printing on either side of film.

ODORLESS, TASTELESS and NON-FLAMMABLE

Lumarith is chemically pure. It does not form decomposition products affecting the taste or purity of the contents and will not tarnish metal surfaces. All films are slow burning. Some formulations will not support combustion.

AVAILABLE

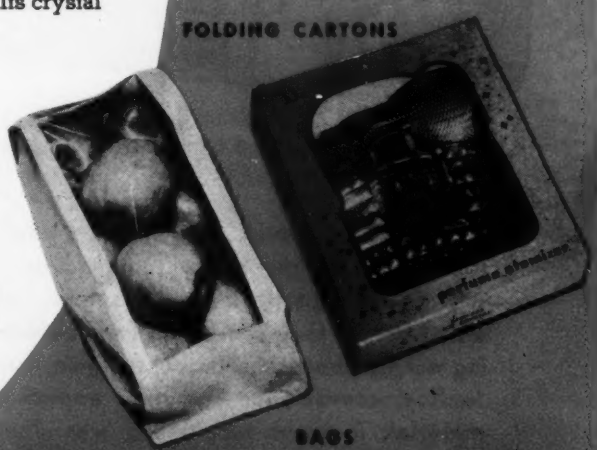
Lumarith films and foils are available in many types and gauges from .0005" to .020"—in master rolls approximately 40" wide—slit-to-width reels—stock-size sheets—cut-to-size sheets—clear transparent or transparent tints.

See other Lumarith Advertisements pages 468-469, 602-603

•Reg. U. S. Pat. Off.













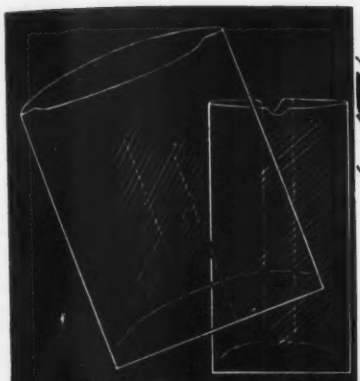
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Sewn Containers

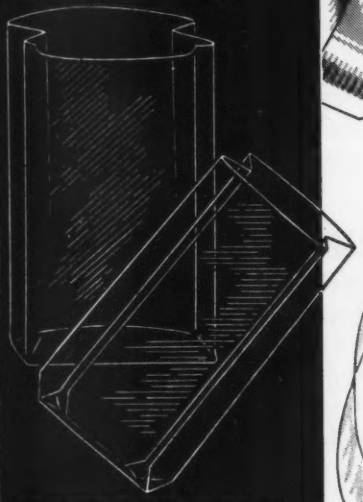


SEWN CONTAINERS are always a vital part of the packaging picture. Today they are serving on the home front and on the war fronts in the packaging of numerous delicate parts, instruments and supplies, working for the Armed Forces as efficiently as they served civilians before war was declared. When industry is turning out its peacetime products again, our SEWN CONTAINERS will contribute protection, convenience and sales appeal as heretofore. In the meantime, with many materials in scant supply and war purposes having priority, we must await the cessation of hostilities before returning to the manufacture of SEWN CONTAINERS in volume for the established peacetime uses.

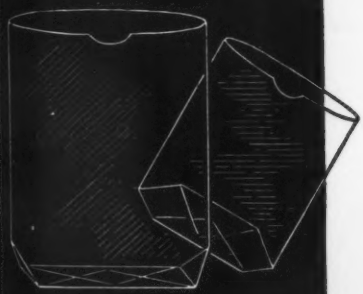
Cottonluxe
MANUFACTURING CO.
593 EAST 137TH STREET
NEW YORK, N. Y.



FLAT STYLE BAGS, supplied with die cut lip, thumb notch or cut straight at top, without lip.

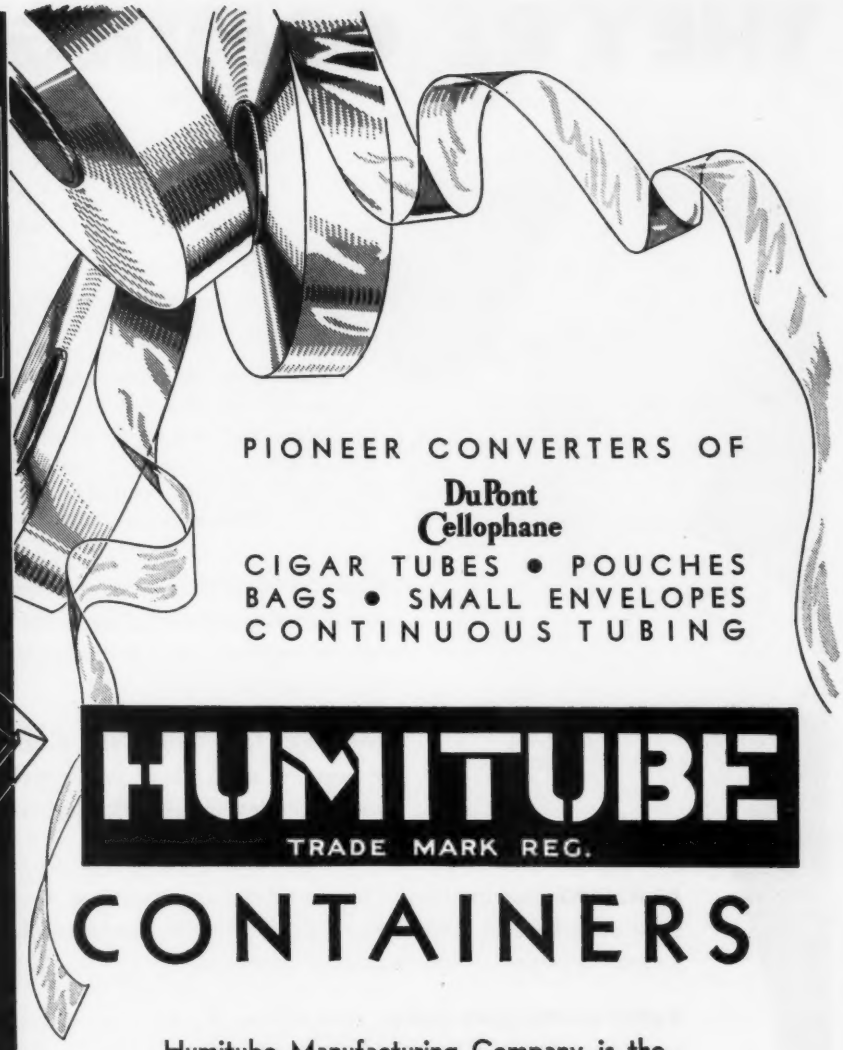


SQUARE STYLE BAGS, supplied with die cut lip or cut straight at top, in a large range of sizes.



SATCHEL BOTTOM BAGS, supplied cut straight at top or with thumb notch.

DUPLEX STYLE BAGS, using combinations of grades and weights of "Cellophane" to form double wall bags, are available.



PIONEER CONVERTERS OF

DuPont Cellophane

CIGAR TUBES • POUCHES
BAGS • SMALL ENVELOPES
CONTINUOUS TUBING

HUMITUBE

TRADE MARK REG.

CONTAINERS

Humitube Manufacturing Company is the centrally located source of supply. Ready to serve you with stock sizes or with bags especially made and printed to fit your packaging problem.

"HUMITUBE" — the original crimp sealed pouches, in flat and tuck styles, are economically taking thousands of small products to market—providing full visibility and protection.

We invite inquiries. Write for information on plain or printed cellophane containers.

HUMITUBE MANUFACTURING CO.

(CONVERTERS OF DU PONT CELLOPHANE)

PEORIA 3, ILLINOIS

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THEY'RE COMING BACK!



War-time demands have necessarily limited the distribution of these familiar lines. But A.P.G. products, with their quality, usefulness, adaptability and economical advantages, *are coming back!* Plan *now* to use them!

ENVELOPES: Catalog, clasp, coin and special packaging styles. Plain or printed, stock or special sizes, in kraft, manila, white or special papers.

AMKLEER CELLOPHANE: Bags and envelopes — stock sizes and specials — plain or printed. Bags in flat, square and satchel-bottom styles.

GLASSINE: Serrated-edge bags and die-cut envelopes in special sizes as well as all stock sizes—plain or printed—standard glassine or special papers. Bags—waxed or unwaxed.

PURITAN ROUND CUPS: After victory, Puritan Round Cups will once more be plentiful — and more attractive than ever before—in all styles—water, cold drink, take-out, food pack, and hot drink.

PURITAN FLAT CUPS: There are 2 styles—the Modern Puritan, made of treated stock with a safety lip and tapered to fit the hand. The Plymouth, smaller, with a safety lip, made of untreated stock and packed in self-dispensing cartons.

The American Paper Goods Co.

APGCo

50 YEARS OF SERVICE

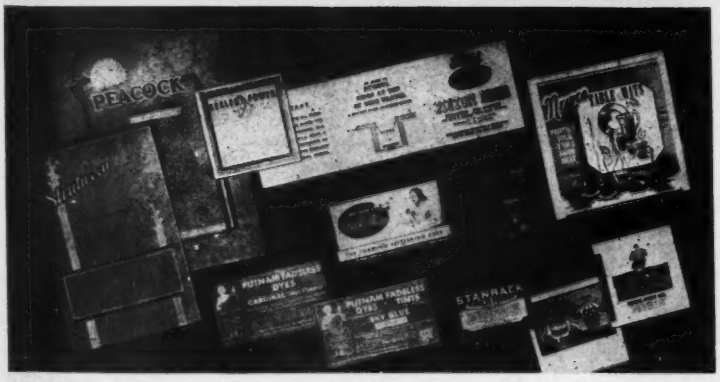
KENSINGTON, CONNECTICUT CHICAGO, ILLINOIS

Under One Roof









A Complete PACKAGING SERVICE

—because Cupples-Hesse Corporation manufactures diversified paper products you can be sure their recommendation for your package will be one that has duly considered *all types* of paper packages—their merits and demerits. The photographs show only a few of the Cups, Bags, and Envelopes that have been employed to complete satisfaction by companies operating locally or on a national distribution basis.

Send your package problem to Packaging Division.

Cupples-Hesse CORPORATION
MANUFACTURERS — PAPER PRODUCTS
4175 N. KINGSHIGHWAY BLVD.
ST. LOUIS 15, MISSOURI



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U.S. SIGNAL CORPS PHOTO

WERE PACKED IN **UNION PAPER CASE LINERS**

ONE OF THE MANY IMPORTANT PRODUCTS furnished by Union as its contribution to the war effort in 1944...When Victory is won, the entire facilities of the world's oldest and largest manufacturer of paper bags will again be turned to the production of bags and paper for civilian packaging requirements.

UNION BAG & PAPER CORPORATION
WOOLWORTH BUILDING, NEW YORK, N. Y.

GOOD WOOD
and fabric packages are essential IN WAR

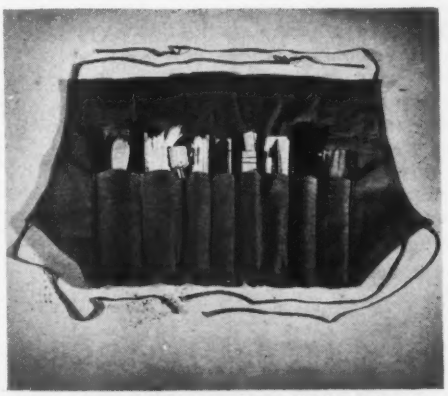
and peace



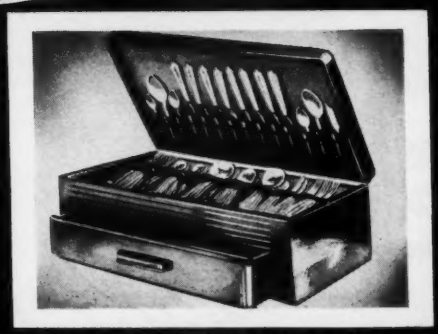
Heavy-duty wood box for rugged war use.

Eureka has contributed more than 100 packages to America's war effort. They prove conclusively that soundly designed and produced wood and fabric containers have important utilitarian as well as merchandising purposes.

We make rolls, bags, cases and . . .



Fabric bags hold Army-Navy lifeboat & aircraft fishing kits.



Beautiful wood chest is container for silver service.

. . . chests of a wide variety of materials, in a complete range of prices, qualities, sizes for many packaging purposes. Our facilities will be at the service of all industries, enriched and broadened by our extensive wartime developments, when the war emergency ends.



Fabric rolls and bags protect fine silverware.

EUREKA MFG. CO., INC. TAUNTON, MASSACHUSETTS



TODAY your package stands at the crossroads — the point where your business must turn from marketing methods of a wartime economy to the bitter competition of peacetime selling wherein supply threatens to saturate demand. • TODAY you need a package bombshell — a flexible package directly "On Target". And your target is consumer acceptance. • AT this moment, you need ONEIDA PAPER PRODUCTS INC., for more than 50 years designers, manufacturers and printers of flexible packages that SELL. • SELLING is the final test your package must pass. Packages that SELL are the targets of ONEIDA engineers. As they move along the road of container development, the eyes of our experienced men never stray from the Bullseye. • SELLING is their objective when they decide the shape of a bag, the materials from which it will be made, elements of design and its coloring. • BUT they keep costs low. They avoid over-packaging. They ban extravagant, wasteful use of materials and color. They, like you, ask only:

"Will it SELL again and again and again?"

• When your package stands at the crossroads of peace and war, consult ONEIDA. Buy a package that will SELL!

Stock Size Items

Flat, square and satchel bottom cellophane bags • flat and square glassine bags • waxed glassine bags • duplex doughnut bags • die-cut flat confectionery envelopes • a-b-see window bags • duplex confectionery and nut bags • sandwich bags • garbage bags.

Tops
IN PLAIN AND PRINTED BAGS WRAPS AND ENVELOPES

Made-to-Order Items

Printed and plain bags and envelopes of cellophane • regular and waxed glassine • white wove • m. g. striped • parchment • kraft and special grades in all popular styles and sizes • also cellophane wrappers and rolls • heat seal and laminated bags • inquire.

ONEIDA PAPER PRODUCTS, INC. • 601 WEST 26 STREET, NEW YORK • FORT WORTH, TEX. • 2736 EAST 12 STREET, LOS ANGELES, CAL.



A New Packaging Division

Born of U.S.E. War Packaging Experience

U. S. E. proudly announces the establishment of the *Kellogg Container Division.* Operated for many years as a part of P. P. Kellogg & Co. Division, manufacturing transparent containers and specialties, this unit has during the war grown in packaging experience and in volume, to full-fledged Division stature.

With increased resources and enthusiasm, *Kellogg Container Division* will continue to pioneer in the solution of protective packaging problems — converting water-moisture-vapor-proof materials into heat-sealable containers, manufacturing bags, boxes and envelopes from transparent and translucent materials and plastics; and studying the characteristics of both military and civilian industry requirements.

UNITED STATES ENVELOPE COMPANY
~~13~~ 14 Divisions from Coast to Coast

U·S·E PROTECTIVE PACKAGING

KELLOGG CONTAINER
DIVISION
SPRINGFIELD
MASS.

XUM

Equitable's war-time "bag" discoveries will bring you

PEACETIME PACKAGING DIVIDENDS



It is no military secret that paper bags have been achieving a minor war miracle. Not only did wartime requirements present unusual packaging demands, but paper was called upon to replace scarcer materials. As a result the savings in packaging costs were tremendous. These savings will play a major role during the days of "good old-fashioned competition" to come, and far-sighted packagers are making their plans accordingly. Let Equitable's Packaging Engineers tell you about these amazing paper bag "developments" now. Let Equitable's Research Staff advise you without cost or obligation.



EQUITABLE PAPER BAG COMPANY, INC.

Northern Plant: 4700 31st Place, Long Island City Southern Plant & Paper Mills: Orange, Texas

Warehouses in Allentown, Pa., Atlanta, Ga., Boston, Mass., Buffalo, N. Y., Chicago, Ill., Cincinnati, O., Columbus, O., Detroit, Mich., Indianapolis, Ind., Jacksonville, Fla., Kansas City, Mo., Los Angeles, Cal., Memphis, Tenn., Pittsburgh, Pa., Rochester, N. Y., St. Louis, Mo., St. Paul, Minn., Washington, D. C., Youngstown, O.

It's *True* [illegible] ay-



about Super-Seal

THE LEAK-PROOF CELLOPHANE BAG FOR WET OR DRY PACK



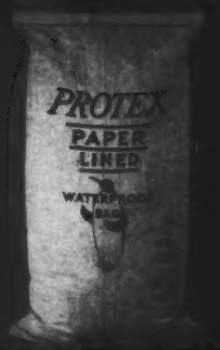
Yes, what you hear *is true* about Super-Seal bags. They are constructed to be leakproof for liquid pack frozen foods, such as fruits in syrup—and siftproof for dry packs.

If you are bothered with leaky bags, you will want to look into Super-Seals, which can be offered only in compliance with cellophane limitation regulations.

THE MUNSON BAG COMPANY
CLEVELAND 7 • OHIO



ALL SIZES AND KINDS
INCLUDING OSNABURG
AND SEAMLESS BAGS



WATER & MOISTURE-PROOF
BAGS OF MANY STYLES
AND CONSTRUCTIONS



2-3-4 OR 5 PLY PASTED
OR SEWED BOTTOMS
VALVE OR OPEN TOPS



COMPLETE ARRAY OF
WEIGHTS AND SIZES



MANY SIZES, COLORS
AND TYPES FOR FRUIT
AND PRODUCE

In Wartime AND *Peacetime* CHASE MAKES THE BAGS YOU NEED

Through 98 years of bag making*, through wartime and peacetime, Chase has learned how to produce the bags you need.

Using cotton textiles, burlaps and papers singly or in combinations, Chase engineers have designed an endless variety of specialized containers—desiccant bags in strips to wrap around superchargers, flannel pockets for ampules of delousing agents, laminated waterproof bags, bomb cap covers and a whole host of other war products to say nothing of a great array of standard bags.

Whatever your bag needs may be, it pays to line up with Chase. Write or phone your nearest Chase office today.



PAPER BAGS FOR FLOUR,
SUGAR, SALT AND OTHER
PRODUCE



CRINKLED PAPER
LINERS FOR BAGS,
BOXES AND BARRELS



SMALL BAGS FOR PARTS,
DESICCANTS AND MAILING
PURPOSES

★

Coast to Coast Bag Service

CHASE BAG CO.

GENERAL SALES OFFICES, 309 WEST JACKSON BLVD., CHICAGO 6, ILL.

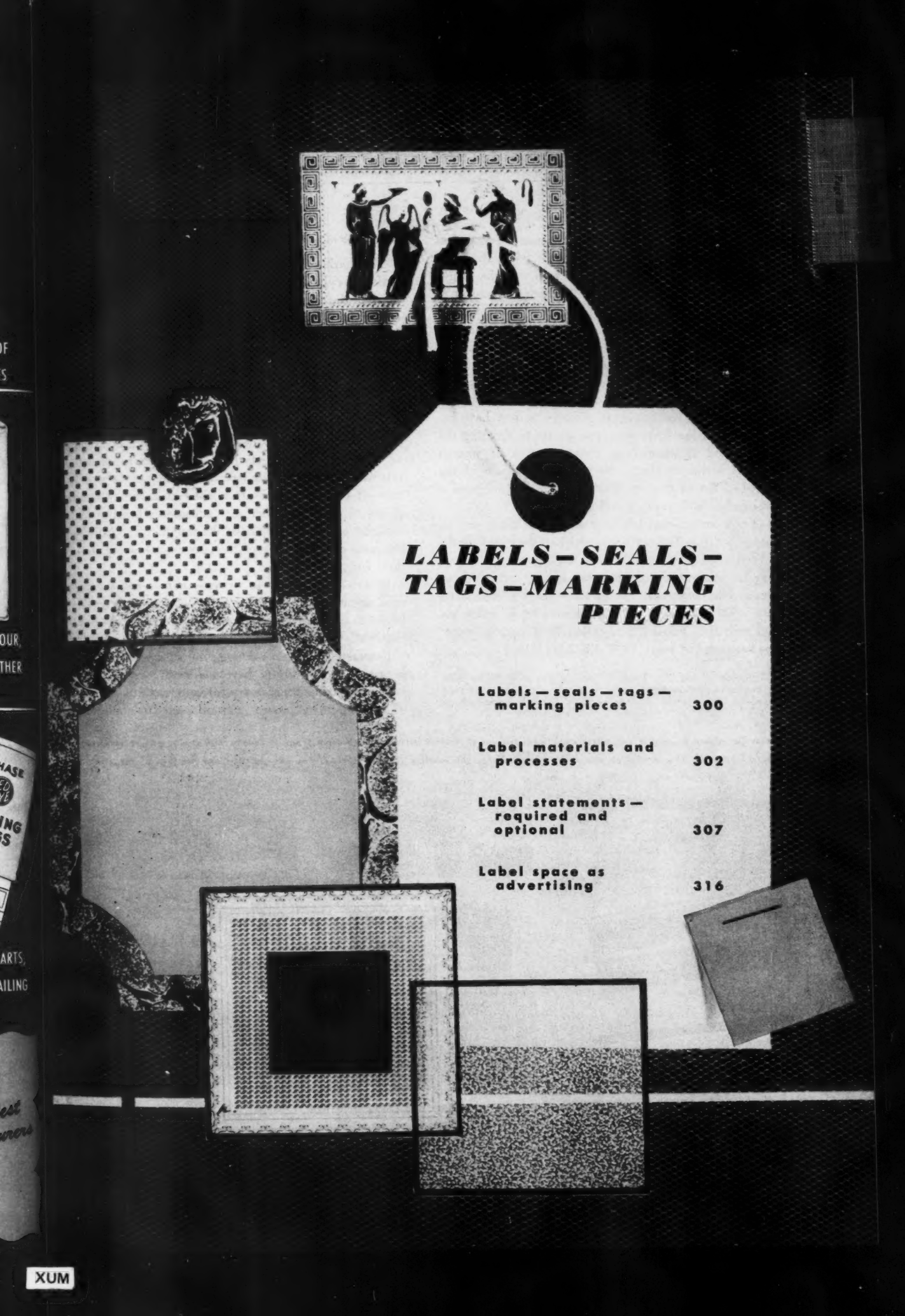
BOISE	BUFFALO	KANSAS CITY	OKLAHOMA CITY
DALLAS	ST. LOUIS	MINNEAPOLIS	PORTLAND, ORE.
TOLEDO	NEW YORK	GOSHEN, IND.	REIDSVILLE, N. C.
DENVER	CLEVELAND	PHILADELPHIA	HARLINGEN, TEXAS
DETROIT	MILWAUKEE	NEW ORLEANS	CHAGRIN FALLS, O.
MEMPHIS	PITTSBURGH	ORLANDO, FLA.	HUTCHINSON, KAN.
		SALT LAKE CITY	WINTER HAVEN, FLA.

* CHASE

America's Oldest Bag Manufacturers

★

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LABELS–SEALS–TAGS–MARKING PIECES

Labels — seals — tags — marking pieces 300

Label materials and processes 302

Label statements — required and optional 307

Label space as advertising 316

Labels—seals—tags—marking pieces

by Charles R. Cosby

If the Greeks had a word for it, the Romans nevertheless had a label for it, at least to the extent of inventing and popularizing the word from which we derive the Anglicized form of "label." It remained for modern language to apply the word in a metaphoric sense to persons, meaning to place a person in a definite category, as if actually emblazoned in bold and unmistakable characters. For example, a person who is said to bear a party label is thereby classified and identified. Language and meaning have reached maturity when the words to describe the commonplace things like the markings of early pottery have become, through the centuries, appropriate to describe the qualities and distinguishing characteristics of human beings. It serves to clarify the true significance of the label when the narrow sense of the term has achieved a figurative but still explicit definition.

It is now known that labeling was the primary step in the art of writing. The earliest practice of the use of markings for the purpose of conveying intelligence was found among the excavations of Sumerian habitations in Mesopotamia. The communal life of these people, who lived nearly 5,000 years ago, has been placed by scientific research near the end of the so-called Uruk period, somewhere between the years 3500 and 2900 B.C.

NOTE: Most of the illustrations in this chapter indicate by code marks the label manufacturers to whom credit is due for assistance in supplying appropriate illustrations. This code is explained on page 318.

The origin of labeling

The markings practiced by the Sumerians consisted of seals or cylinders bearing the peculiar and distinctive mark of the owner. These were the first assertions of property rights—they were the evidence of ownership. Naturally they were placed on objects of value which, as they passed from one generation to another or from hand to hand in exchange for other objects of value, became marks of authenticity. Their value depended upon the honor and prestige of the mark.

As commerce and trade developed between nearby communities there was developed a medium of exchange or currency. The objects used for this purpose had an intrinsic value, expressed according to weight and fineness—a practice which established as currency familiar pieces of metal or other rare substances bearing weight designations and the mark of the weigher. The validity of the piece and the mark of the issuer, spoke very well indeed for themselves.

It was unnecessary to provide names for the pieces used as currency, although in the course of time, things began to have names, represented by certain marks which eventually became letters of the alphabet.

Commerce and the exchange of commodities made it necessary for goods to have marks of origin. Methods of packing made it necessary for containers to have marks of contents. That system was adopted for trade among

1—Labels for canned fruits and vegetables make extensive use of product pictorials with many types of novelty and display effects which are rich in advertising value. This illustration also shows examples of grade labeling, recipe labeling, two-way labeling and the use of the stock label.



TABLE I.—KEY TO LABEL & MARKING PIECE ILLUSTRATIONS

Product Groups	*Metal cans*	*Glass jars or bottles*	*Wooden boxes and baskets*	*Paper or fibre cartons & boxes*	*Paper, foil & cellophane wraps*	*Bags*	*Articles & pieces*	*Illustrations*
Advertising Stickers							×	Fig. 20
Bakery Goods				×	×			Fig. 10
Beer and other Malt Beverages	×	×						Fig. 6
Beverages, non-alcoholic		×						Fig. 7
Candy, Chewing Gum					×	×		Fig. 11
Cereals and Alimentary Pastes		×		×				Fig. 12
Coffee	×	×						Fig. 16
Cosmetics and Toilet Goods		×						Fig. 13
Dairy Products, Milk, Cheese	×	×		×				Fig. 4
Distilled Spirits & Wine		×						Fig. 22, 23
Drugs and Medicines	×	×		×				Fig. 21
Fats, Oils, and Shortenings	×	×		×				Fig. 9
Fresh Fruits & Vegetables			×	×				Fig. 8
Frozen Foods				×				Fig. 2
Fruits, processed	×							Fig. 1, 27
Hardware, Toys, Utensils							×	Fig. 17
Hosiery, Fabrics & Textiles							×	Fig. 26
Jams, Jellies, Salad Dressings, Condiments and Nut Products		×		×		×		Fig. 14
Juices and Syrups	×	×						Fig. 5
Meat Products, Fish, Seafood and Dog Food	×	×		×	×			Fig. 9
Paints, Varnishes & Polishes	×	×						Fig. 24
Soaps and Household Cleansers	×			×		×		Fig. 25
Tobacco Products	×		×	×	×			Fig. 18
Vegetables (processed) & Soups	×	×						Fig. 1, 27

dealers, as distinguished from consumers. Measured by the yardstick of time and history, the art of packaging for consumer distribution is of very recent origin. Despite its newness, packaging has been made possible by utilizing one of the oldest methods of communicating human intelligence, namely, the marking of goods to establish identity and authenticity.

Within the memory of persons now living, it was the general practice to dispense goods from bulk into containers furnished by the customer. Such products as prunes, sugar, crackers, candy and other foodstuffs were wholesaled in bulk to retail dealers, who scooped, weighed and sometimes packaged each customer's order as and when wanted. In those days, time was something which everybody had plenty of, the neighborhood store was a comfortable spot in which to kill time and swap gossip, and nobody was bothered with new-fangled notions about modern efficiency.

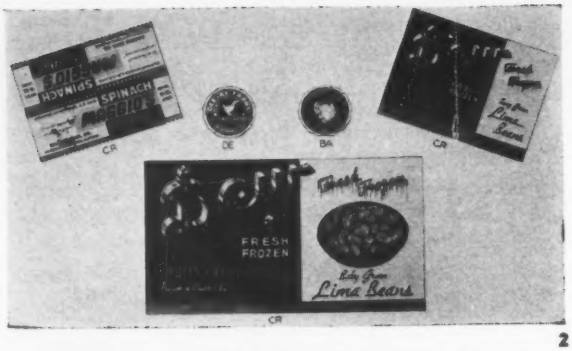
Nevertheless, even then the enterprising jobber's salesman was smart enough to discover that he could write bigger orders if he always sold some paper bags with each lot of bulk prunes and each keg of hard candy. Even the storekeeper found that his spare time could be used to tie up packages in anticipation of the next day's sales. He noticed that every commodity has a natural order-size for consumer use. Moreover, he learned that the customer never did like the unsanitary appearance of goods which were packed in bulk.

The retailer was quite willing to let the wholesaler and the manufacturer take the entire packaging job completely off his hands.

In the meantime the country was becoming more thickly populated and the retail outlets were vastly increasing in number. People began to read newspapers. The packages bearing brand names, aided and abetted by the force of advertising, began to make their way into the corner and cross-roads stores. Better and faster transportation enabled people to move about more freely in the exercise of their privilege of buying where they might choose. This freedom of movement of goods and people increased the play of competition and the need to restore the frankness and forthrightness which characterized the simple commerce of early traders.

When the contents disappeared behind container walls it became necessary for the package markings to assume some responsibility for the concealed contents, their source, quality and quantity. It was inevitable that some goods bought on faith without inspection should turn out to be something less than was expected. Many causes of dissatisfaction arose. The opportunities for fraud were numerous. At any rate, someone (the government) representing the public had to step in and say with authority: "Be honest and tell the whole truth regarding the contents of closed containers." Packaging and labeling thus arrived at their present state of mutual dependence and helpfulness. Thus the system of distribution had evolved to the point where the label speaks for the qualities which the *uninformed* purchaser is expected to accept . . . qualities represented by label statements that cannot be verified by casual examination.

Correct labeling is a boon to the honest seller because it eliminates the deception and trickery of dishonest competitors, a course of dealing which tends to discredit all merchandising. The success of mass distribution and the



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↓4

3



hope for comfortable living must depend upon *confidence* in the product.

Types of labeled items may be classified and subdivided into groups, although the border lines between classes are not clear and distinct. When does a package cease to be a package? One answer is, when the contents can be inspected without breaking the covering. However, "content" means something else when it is used in regard to a piece of fabric.

The need for labeling begins at the point where the consumer is asked to take something on faith.

Labeling may consist of graphic matter imprinted *directly* on the product; for example, the outer skin of a fruit or melon. Paper labels are often *pasted* on fruits or melons, and decalcomania transfers are made on hosiery and garments. Statements appearing on such articles must be truthful and in full compliance with any regulations that would pertain to a closed package of the same articles.

In addition, labeling is sometimes accomplishd by printing *dirctly on containers*, or by embossing without the use of any paper or ink. The pre-coated cans used for shipments overseas during World War II have been labeled by one or the other of these two methods. (See *Can Decorating* p. 487)

Label materials & processes

Types of containers and packages determine, to a large extent, the materials and the processes entering into the specifications of the labels. For example, labels for metal cans are fundamentally different from bottle labels. A classification of types of containers therefore results in an approximate grouping of types of labels. The illustrations used in this chapter have been arranged, so far as possible, in the product groups indicated on the chart on page 301.

Styles and varieties of labels are as numerous as the classes of objects to which the labels are attached. Paper is the favorite basic substance because its qualities can be readily adapted to various finishes and processes. Combinations of paper and metallic foils are capable of producing many interesting and artistic effects. Labels which use adhesives depend for their permanence upon the rigidity of the surface to which they are affixed. Tagboards and other strong grades of paper are used where the method of attachment requires a substantial body for the label in order for it to stand up.

Labels for canned foods are usually of the wrap-around type. The ends of the label overlap and are pasted together by the operation of the labeling machine. The labels are held in position on the cans by a few spots of

2—The development of the frozen food industry offers new fields for the design of new types of labels. 3—Metalized paper labels have an attractiveness which is adaptable to many types of packages, and they may be embossed to accentuate the third dimension. 4—Dairy products are marketed in a variety of containers, call for a range of label treatment.

glue, otherwise there is no adhesive between the label and the can. The reverse side of the label may be printed with recipes, if desired.

Labels for glass jars may be of the wrap-around type, but the adhesive problem may be different, especially for narrow band labels which lack strength and protection against lateral thrusts.

Closed containers

For the labels of cans, special grades of paper, suitable for the particular purpose, are used. The stiffness and flatness of the paper have a certain relationship to the direction of the grain, as well as to the size and shape of the label.

Those papers which are to be varnished, embossed or otherwise treated by the graphic arts processes are selected because of their suitability for the purpose. No single kind of paper is considered best. These technical details are usually decided by consultation with the manufacturers of the labels and the labeling equipment. There should be proper coordination between all the factors that determine the success of the labeling.

Varnishing adds brilliance and permanence to a label, protecting it from soiling and thus prolonging its effective life. Lacquering has a very definite place on certain types of labels. Spot varnishing may be applied in the printing process.

Embossing is a form of bas-relief, one of the earliest methods of depicting the third dimension (perspective), and thus enhancing the artistic effect (Fig. 3). One specialized form of embossing is called "pebbling." At comparative low cost this process add an interesting texture to the entire surface of a label.

Food products which are expected to have appetite appeal are usually designed with a pictorial representation of the food in natural colors. To this is frequently added a picture of a combination of foods prepared from a recipe (Fig. 1). Color photography, combined with the graphic arts (4-color) processes, enables the artist to obtain effects which markedly increase the sales-appeal of the product.

Metallic inks and dusting powders, when available, are used to accentuate parts of the label design that are susceptible to such treatment. Gold and silver effects are often employed.

Glass containers offer certain opportunities for the display of the actual contents, especially in the case of fancy fruits which are packed whole. Glass containers may use wrap-around bands or they may use spot labels. Different types of labeling machines are used for spot labels, which predominate on bottles and other glass containers. Spot labels use an adhesive over the entire surface next to the container. The adhesive is either applied by the labeling machine or by the use of pregummed paper. In using spot labels the quality of the adhesive is quite important, and the adhesive manufacturers have developed a wide range of special-purpose adhesives. On certain types of products and certain bottles, the objective is to affix the label for the term of its natural life, but on other bottles—beer and soft drinks—(Fig. 6 and 7) the adhesive is expected to give up its job after one trip to the consumer.

Bottles which are collected and reused for the same product may have the entire "label" blown in the bottle, and certain processes have been devised for obtaining color and decorative effects permanently applied to the walls of the container.

Some products regularly use a combination of paper labeling and blown glass labeling; for example, bottles for distilled spirits are blown with the contents statement and the statutory Federal legend but nevertheless also use very artistic paper labels. It is possible to concen-



5

5—Canned fruit and vegetable juices are constantly growing in popularity. Because of their intrinsic color and appeal, these products afford excellent opportunities for interesting labels.

trate all the mandatory label requirements on the cap or closure of the container although it is not customary to waste any container space that can be used to sell the goods *and more goods*. Per square inch of display space, container walls are usually esteemed to be among the most valuable of places which can be used for advertising purposes by the producer.

Fruit boxes

Fresh fruits and vegetables are packed in boxes of various sizes and capacities, and these containers have been standardized by Federal law. Many of the agricultural products themselves have been standardized, and as such they are permitted to be labeled with the letters "U. S." (Fig. 8)

Product stickers

Individual vgetables and fruits are often labeled to show the ranch or farm where grown. There is no doubt that such advertising helps to build up a demand from the public. When the consumer asks for goods by name, there is less difficulty in placing the product in the channels of trade. Meats, bakery products and other foods are often labeled with stickers. The label paper is greasproof and does not soil, or soak up grease and shortening. Special inks for the printing of such labels are also made to resist grease so that they will not run or "bleed off" on the food product. (Fig. 9)

Bakery goods—thermoplastic labeling

Roll-type labels and thermoplastic adhesives are not new. For many years roll-type address stickers have been available, and so far as thermoplastic adhesives are concerned, there have always been hot-melt resins together with the more recent nitro-cellulose compounds.

There has been considerable progress in the direction of economy, and for this the baking industry is primarily responsible. Thermoplastic end labels automatically applied from a roll are now widely used on bread, cake and bun packages.

The usual types of thermoplastics previously available were hardly suitable for application to heavily waxed papers because of the difficulty of penetrating the layer of paraffin on the paper.

One company which manufactures paper discovered that their new wax adhesive mixture (amorphous wax involving the addition of latex), developed originally for processed-cheese wrappers, made an excellent thermoplastic adhesive, perfectly practical for labels applied to waxed paper, cellophane, lacquered glassine, kraft paper or almost any type of wrapping material in use today. (Fig. 10)

Other types of thermoplastic hot melts and lacquers are usable in certain instances with cellophane and lacquered glassine, but the mixture of paraffin, latex emulsion and suitable plasticizers seems to be the best over-all answer to the problem.

This thermoplastic is applied either before the printing operation or immediately thereafter depending upon the printing press equipment available (see also *Labeling Machines and Devices*, p. 651)

Tight-wrapped packages

Metal containers with cylindrical walls are strong, which is the reason why they are used to protect fluid contents. However, other types of containers may have rectangular walls. Among these are packages for tight-wrapped articles whose form and substance are adequate to withstand the trip from manufacturer to consumer. The fact that the wrapper completely envelopes the article and renders it *uninspectable* makes it "packaged goods," sold on faith, and therefore subject to labeling laws for the benefit of the innocent consumer.

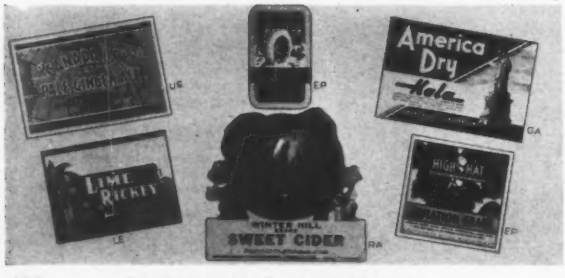
The tight-wrapper of a set-up box is, or may be, its label. Of course the label could be on the box, just as it could be on a carton, provided the outer wrapper is transparent so as not to interfere with the legibility of the label. This would depend upon the availability of cellophane or other transparent wrapping material. Many

6—Label makers know that labels for beer and soft drinks must undergo the hazards of refrigeration. Colors and designs are selected accordingly. 7—Many and varied are the nonalcoholic beverages which now stock the dealers' shelves. Their labels comprise a wide field for design.

6



7





8—*The crates which carry fresh vegetables bear bold and colorful labels. This field offers a variety of subject matter and many possibilities for rich color and adventurous design to the artist. Since some of these products and their containers conform to Federal standards, they are permitted to use Government insignia.*

tight-wrapped packages use papers which have been specially designed.

Confectionery and chewing gums (Fig. 11) are in the category of packaged goods which are required by law to be labeled with a statement of the ingredients. Cartons and "shells" for cereal products are large users of tight-wrapped labels. (Fig. 12)

Seals

The seals that identified the Sumerian pottery, the Egyptian papyri and the edicts of the Middle Ages have set the style for the elaborate dignity of their modern counterparts.

Although they are made by graphic arts processes, they retain an individuality that befits the products to which they are attached. Label seals are usually embossed and die-cut to circular or oval shape; they make effective use of metalized papers or foil and they are often hand embellished to produce elaborate artistic finishes. (Fig. 3)

The gummed papers are often employed for seals, in which event the particular kind of adhesive should be selected to suit the surfaces on which the labels are to be affixed. Seals are especially effective on jars and bottles for cosmetics and perfumes. (Fig. 13)

Decalcomania transfers

Decalcomania transfers are used for the reproduction of trademarks, brand names and other data upon packages of glass, metal, plastic or wood—any type of rigid container, in fact, which permits either the product or the surface of the package to serve as a background for the lettering or the decoration. This process of applying transparent labels to containers permits the use of a great number of colors and the attainment of highly decorative label effects.

Once it is properly applied, a decalcomania becomes a permanent part of the surface, withstanding cleaning and considerable wear. (Fig. 15)

Transparent labels

The effects of a transparent label may be achieved on rigid containers and displays made of cellulose acetate or nitrate. The sheet of material is printed or stamped from roll leaf while flat and then fabricated into a three-dimensional container. If the printing is designed without a background, the transparent label becomes an integral part of the container.

Labels may be printed on sheets of cellulose film which are backed with a suitable adhesive to make them adhere closely to the walls of a glass or plastic container. Since the carrying material is thin and transparent, the type and decorative matter seem to be applied directly to the surface of the container. When such printing is applied in reverse to the rear surface of the cellulose material, the label becomes impervious to stains, water, grease, etc. These labels may be successfully applied to glass, plastics, metal, wood, rigid transparent cellulose and non-absorbent papers of all types. Patents are claimed for this labeling process.

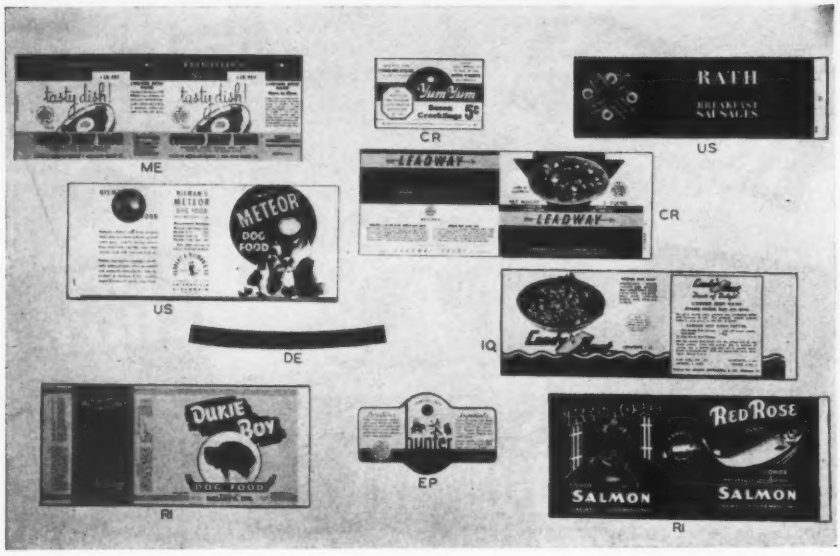
Glass labels

Decorative labeling effects of high order can be obtained through the direct application of color to the glass containers proper.

This treatment, at first restricted largely to dairy and food products, is now used in the cosmetic, pharmaceutical and proprietary fields. Fused-in colors are applied by the manufacturer of the container and are a part of the package itself.

Fibre cans

Different types of containers require different label treatment. Fibre cans are made with cylindrical walls and metal ends for dry powders and are even used as the outer protection of inside containers of viscous liquids in the non-food class. These fibre containers are not intended to be used for products that receive heat sterilization in the containers. However, recent developments in plastic



9

9—Meat products may be sold in packages of diverse types. Regardless of the container employed, however, the labels must conform to the regulations of the Bureau of Animal Industry. Usually, the label paper is greaseproof and does not soak up grease. Special inks for such labels are made to resist grease, will not "bleed off" on the food product.

or semi-plastic container walls have greatly enlarged the scope and promise of such containers for a variety of postwar applications.

Fibre cans may be labeled during their manufacture in which event the metal ends of the cans are crimped over the edges of the label. The dimensions of such labels are therefore a matter to be considered before ordering the labels sent to the can manufacturer. If the labels are to be attached by a labeling machine after the cans have been manufactured, they will have an entirely different set of dimensions.

Decorated metal

Until World War II cut off the tin supply many specialties were packed in decorated metal canisters (now called "cans," for short) if the prospective use and volume distribution of such containers could be considered permanent and readily anticipated. However, packers of food products subject to seasonal variations in quantity, grade and geographical distribution find it more convenient to adjust quantities through the use of paper labels (see *Can Decorating*, p. 487). Stocks of cans are therefore blank until the season's crops and destinations are known to the user.

Many canned foods are stored, unlabeled, until bought by dealers who furnish the labels for their private brands. Among the products packed in lithographed cans, coffee has been a conspicuous example.

Informative tags

Utensils, appliances, tools, implements and equipment are labeled with *informative* tags or attached labels, because the article will give better service if its suitability is fully explained before it is selected by the prospective purchaser. Mere sales talk is never so convincing as the manufacturer's written claim, even if the salesperson is fully competent and trained to conduct the sales negotiations. (Fig. 17)

Tobacco products are required to be labeled with the license number of the factory at which the excise tax was paid. Most cigars are labeled with a band, more or less ornate, to identify the brand (Fig. 18)

Convenience labels

So called convenience labels make no attempt to describe the contents of packages or the articles to which they are attached. Address labels are a familiar type, and there are innumerable "message" labels or stickers which serve a useful purpose when pasted on a package or even on a letterhead. (Fig. 19)

Some of the labels in this group, however, partake of the character and dignity of postage stamps and are extensively used for advertising purposes. They are sometimes called seals although rectangular in shape, and sold in sheets with perforations. (Fig. 20)

Stock labels

Stock labels in semi-complete form enable small distributors to avoid the expense of special label designs and at the same time obtain quick delivery of quantities to suit their immediate needs. By imprinting a few additional details, "stock labels" are ready for use in less time than would be required to prepare special labels. Specialists in this line offer a wide choice of designs, not only for can labels but for the die-cut variety of bottle label as well.

Circulars

Folders or circulars which accompany articles at time of sale are in the category of labels even though not attached to the articles. Even in cases where the circulars and the goods are shipped separately, the Supreme Court has held that the common origin and destination of both circular and product produces a situation which brings the circular within the definition of labeling. In such cases both the Federal Trade Commission and the Food and Drug Administration have jurisdiction in protecting the public against misrepresentation.

Outserts

The practice of using surplus label space to advertise other products has been extended still further by using the package or container as a carrier for circulars that are cleverly folded so as to remain closed when labeled to the outside of the container but are easily detached when the container reaches the hands of the consumer. These folded circulars have become known as "ouserts." They can be labeled by hand or machine to the outside of cans, bottles, jars, cartons or bags. Their functions may be summarized as follows:

1. Variety of uses of recipes
2. Cross advertising (using one product to help sell another)

They can also be used to promote premiums without wasted circulars and without entailing additional cost for distribution purposes.

Labels with personality

It is not necessary for a food product label to be formal and prosaic. Foods for humans, prepared by humans, can never lack human interest, so why not give them personality? Many recent examples of the label makers art (Fig. 1) have used surplus label space to depict fanciful characters of the farm and kitchen, joyful in their preoccupation with harvesting and processing, not to mention the incidental diversions that bring refreshments and appetite appeal to the products of the soil.

Packaging materials

Packaging materials have suffered the usual casualties of war, and many shifts have been necessary. The types of containers used for packing agricultural products in 1944, according to data released by the War Food Administration, were apportioned among the several kinds of packaging materials—glass, metal, and other materials —*approximately* as shown in Table II, these percentages being based on the number of containers of each class.

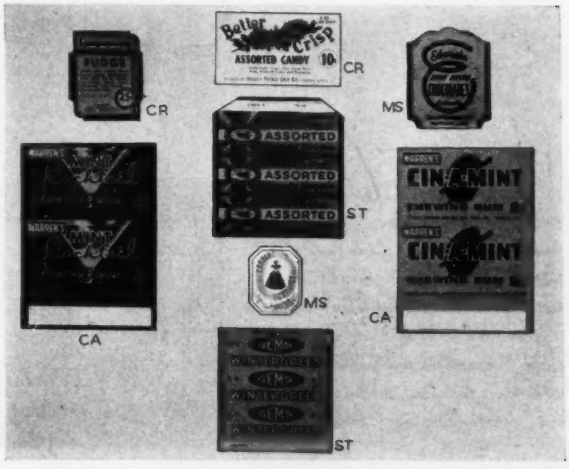
Table II.

Food Product	*Glass*	*Metal*	*Other packags*
Fresh and Frozen Fruits & Vegetables			100%
Fruits and Fruit Juices	30%	70%	
Vegetables and Vegetable Products	10%	90%	
Fish and Fish Products	15%	85%	
Meats, Oils and Fats	38%	60%	2%
Dairy Products	4%	85%	11%
Syrups and Honey	32%	2%	66%
Beverages, alcoholic and non-alcoholic	82%	10%	8%
Cereals and Bakery Goods			100%
Candy, baby foods, spices, seasoning, flavoring, etc., etc.	3%	1%	96%
Dog Food			100%
Tobacco Products			100%

10



11



Label statements—required and optional

Labels carry the message in which physical objects are permitted to describe themselves. What messages *must* they carry? What messages *may* they carry? Public opinion demands certain minima of truth and accuracy. To prevent false or misleading representation, many substances are required *by law* to be labeled adequately to inform the public regarding the true character of these substances. Laws also contain provisions that certain substances, if labeled shall be honestly and correctly labeled. The sources of law are either Federal, state or municipal. (See *Food, Drug and Cosmetic Act.* p. 107)

(Continued on next page)

10—Bakery goods may be labeled in many ways: end tags may be affixed with string, identity cards placed inside of transparent wrappings may serve as labels, or the label may be an end seal which serves to identify as well as to seal the wrapper. 11—Small confections, packaged by mass production, need precision labels as well as identity and attractiveness.

Definable qualities of goods

Developments in labeling follow closely the progress made by science in defining properties and qualities of articles offered for sale to the general public. Research must first determine what properties are definable and must establish practicable tests and standards by means of which the labeled products may be tested for compliance with the standards. Unless compliance can be tested within a reasonable degree of accuracy, it would not be practicable to set up a legal definition and a penalty for offering a product that does not conform to the minimum legal requirement.

This practical view of the enforceability of minimum legal standards has resulted in the enactment of laws which *require* certain statements (frequently called "mandatory statements") but which nevertheless *permit* other statements (frequently called "permissive statements"), provided they do not directly or inferentially misrepresent the qualities of the product.

The mandatory statements in regard to any product are those statements which the law makers think should define the qualities which are likely to be misrepresented to the extent that an innocent purchaser might be harmed by the deception. The product should have the properties which are ordinarily expected by the consumer, and the product should not be adulterated or misbranded to the extent that its value for customary purposes is deceptive.

The development of labeling laws

More than 35 years ago, Dr. Harvey Wiley began his crusade against adulteration, misbranding and the use of preservatives to conceal inferiority in foods. As a result, the nation acquired the Food and Drugs Act of 1906 which immediately became the criterion of labeling in interstate commerce. Although intended mainly to require the disclosure of specified ingredients, the subsequent amendments to the law gave it the control of quantity declarations, and it establishes a standard of quality for each canned food.

More recently the Copeland Food, Drug and Cosmetic Act of 1938 has taken over and enlarged the scope of quality standards and the disclosure of ingredients. Many of the states have followed the Federal pattern by passing similar or identical Food, Drug and Cosmetic Acts. Other Federal agencies have also been clothed with greater authority. Recent amendments to the Federal Trade Commission Act have given it more effective jurisdiction over unfair practices in commerce, including false representations in the sale of goods. Under authority of a special statute, the Federal Alcohol Administration has issued detailed regulations for the identification and labeling of liquors, wines, malt and other alcoholic beverages. The procedures for determining standards now have all the force and, incidentally, all the intricacy of law. In fact, the principal activity of the Label Manufacturers National Association is the study and interpretation of laws, regulations and rulings as the basis of detailed advice to its members regarding correct labeling under Federal, state and local laws.

Label defined

The term "label," as used in the Federal Food, Drug and Cosmetic Act, means "a display of written, printed or graphic matter upon the immediate container of any article; and a requirement made by or under authority of this Act that any word, statement or other information appearing on the label shall not be considered to be complied with unless such word, statement or other information also appears on the outside container or wrapper, if any there be, of the retail package of such article, or is easily legible through the outside container or wrapper."

The Act also states that the term "labeling" means "all labels and other written, printed or graphic matter (1) upon any article or any of its containers or wrappers, or (2) accompanying such article."

The regulations state that "labeling includes all written, printed or graphic matter accompanying an article at any time while such article is in interstate commerce or

12



12—Tight wraps, used for prepared flour, uncooked cereals, etc., are labels with a double duty—they protect contents from sifting and infestation and also present areas which may be used as advertising panels to carry recognition marks, illustrated directions for use, premium offers and other consumer information.

held for sale after shipment or delivery in interstate commerce."

The mandatory label statements

The requirements of the Federal Food, Drug and Cosmetic Act in respect to food labeling are basically few in number. Generally, these requirements are: first, the *name* of the product, if defined and standardized, under administrative procedure, otherwise a complete description including a statement of ingredients; second, the *quantity* in the container; and, third, the *identity* of the packer or distributor, and there is a possible fourth—if *artificial flavoring, coloring* or *preservative* is present, it must be declared on the label.

Legally, these three or four facts must be conspicuously shown on the portion of the label intended for display purposes. The only restriction of the remaining label space is that it may not be used to diminish the conspicuousness of the required statements or to mislead the purchaser regarding the quantity and quality of actual contents of the container.

High lights of the Federal act

Compounds—The labeling of a product which contains two or more ingredients may be misleading by reason of the designation of such product in such labeling by a name which includes or suggests the name of one or more but not all such ingredients, even though the names of all ingredients may be completely stated elsewhere in the labeling of the product.

Ingredients—The presence of spices, flavorings, artificial colorings or chemical preservatives must be stated on the label. A product consisting of two or more ingredients, if the product is not defined by regulations, it must be properly labeled to reveal the proportion of each of the ingredients.

Even though it may not be in package form, a food which contains spices, artificial coloring, flavoring or chemical preservative must be labeled to reveal that fact. Certain ingredients are required to be named if present in drug products.

Drugs—Detailed provisions cover the definition and labeling of "new" drugs. Certain provisions apply specifically to the labeling of narcotics and of the habit-forming drugs.

Vitamins—Any food which purports to be intended for special dietary uses is required to bear certain label statements in regard to the basis of any claims which mention the presence or absence of certain ingredients such as vitamins, calcium, phosphorus, iron, iodine, protein, fat, carbohydrate, saccharin, and the nutritional or dietary effects attributed to the food product. A mere listing of such ingredients naturally occurring in the product does not necessitate a supplementary label statement but any modification of the product in relation to such ingredients or any imputation of usefulness in a special diet may require a special label statement in order to comply with the regulations.

Scientific opinion—Where there is a material weight of scientific opinion contrary to a representation made on a label, this fact may render the label misleading and therefore illegal.

Distribution—If a product is not manufactured by the person whose name appears on the label, the name must be qualified by a phrase which reveals the connection such person has with such product, such as "Manufactured for and Packed by . . .," "Distributed by . . .," or another similar phrase which clearly expresses the facts in the case.

Street address—If the name of the manufacturer or distributor of a product is not shown in the current city directory or telephone directory, it is necessary that the label shall show the street address in connection with the place of business. *(Continued on next page)*



13

13—Labels for cosmetics must have beauty and dignity. At the same time, they must be small enough to permit the good looks of the container to show to advantage and the color of the product itself to be revealed.



14

14—Bottles, jars and heat-sealed bags call for the label types which are represented in this group. Note the die cutting which is employed to enhance the visual effectiveness of transparent packages.



15

15—Decalcomania transfers may be employed on any type of rigid container. They often appear as the labels for cosmetic products, imparting an air of distinction and look of costliness to the package.

Conspicuous information—Any word, statement or other information required to appear on the label must be prominently and conspicuously shown on the part of the label which is presented or displayed under customary conditions of purchase. In other words, the consumer must have every opportunity to observe the facts in which she is or may be interested. Failure of the label to include all the essential information will not be excused because of the fact that the label space is used for purposes not required under the statute or because of the fact that the label does not use all of the space available for such a statement on the package.

English language—The English language is required for all mandatory label information; if the label contains any representation in a foreign language, all words, statements and other information required by the Act must appear thereon in the foreign language. However, the foreign language must not be permitted to interfere with, or use the space needed for, the labeling which is required in the English language.

Contents—Detailed provisions cover the manner of stating the quantity of the contents in the package, and there is a provision that the statement of weight or measure may be supplemented by the metric weight or measure indications.

With only a few exceptions, the statement of contents must express the quantity in terms of the largest unit of measure contained in the package. For example, the label on a package containing one quart is not permitted to read "2 pints" or "32 fluid oz." Provision is made for tolerances due to unavoidable conditions, and certain exemptions from the provisions are provided for very small packages.

Open containers—Under certain conditions, small open containers of fresh fruits or vegetables are not required to be labeled, but if two or more such containers are enclosed in a crate or other shipping package, such crate or package must bear labeling showing the number of such containers enclosed therein and the quantity of the contents of each.

Exemptions—Certain exemptions, under regulations are provided for shipments of products in the trade, to be processed, labeled or repacked. Exemptions are provided for export shipments if properly labeled according to the laws of the country to which such shipments are to be exported.

Special statutes

Most of the states have enacted revised food and drug laws patterned after the Federal Food, Drug and Cosmetic Act of 1938. Generally, a substance that is properly labeled under the Federal law is also properly labeled under the state law, although in some cases the state laws contain additional or different provisions. Most of the states also have their own pharmacy laws which, so far as they relate to the labeling of drugs and poisons, are in accord with the Federal Food, Drug and Cosmetic Act. (For further information on this subject, see *Special Federal Regulations*, p. 101)

Narcotics, etc.—The states also have their own laws controlling the sale of narcotics and habit-forming drugs, and their own laws in relation to specific poisons or dan-

gerous substances, such as carbolic acid, bichloride of mercury and wood alcohol. (Fig. 21)

Alcoholic beverages are controlled by Federal legislation and its regulations in respect to the labeling of all intoxicating liquors. Some states also have their own laws on the same subject. (Fig. 22 and 23)

Beer and malt beverage labeling has had a hectic career in recent years. When cans were plentiful, canned beer enjoyed a very large distribution. Like all alcoholic beverages, beer and ale are subject to state as well as Federal regulations. Everything shown on the label must be approved in advance by the duly constituted authorities. Type sizes and pictorials are subject to strict rules. (Fig. 6)

Meat products—Many meat products are prepared and packed in the general manner of sterile canned and bottled foods. There are also other methods of placing *meat products in wrappers* or coverings which are required to be marked in establishments where the entire output of food products is subjected to inspection by Federal agents. (Fig. 9)

Poultry products are packed under the jurisdiction of the Agricultural Marketing Administration under standards for both fresh and canned products.

Shellfish—Packing establishments have the privilege of Government inspection under which they may label their goods in a manner to indicate that fact. Strict sanitary regulations cover the operations of the entire establishment. (Fig. 9)

Paints, etc.—Federal and state laws regulate the sale and the labeling of paint, varnish, naval stores, linseed oil, turpentine, putty and benzine. (Fig. 24)

Substances not intended for human use or consumption include pet animal foods, stock or commercial feeds and tonics, livestock remedies, fertilizers and so-called "economic poisons" for destroying insects or pests. Special Federal and state laws apply to many of the products in this category.

Labeling of fabrics (except wool products) and other substances not sold in package form is not usually required by law, but if found falsely labeled, the offenders can be reached by laws which require complete honesty in advertising.

There is now a growing tendency to increase the legal requirements so as to compel complete disclosure regarding component materials and their qualities. The Federal Trade Commission has jurisdiction over honesty in advertising. (Fig. 26)

Poisons—To protect the public, certain label devices are required by law: for example, the skull and crossbones on poison labels.

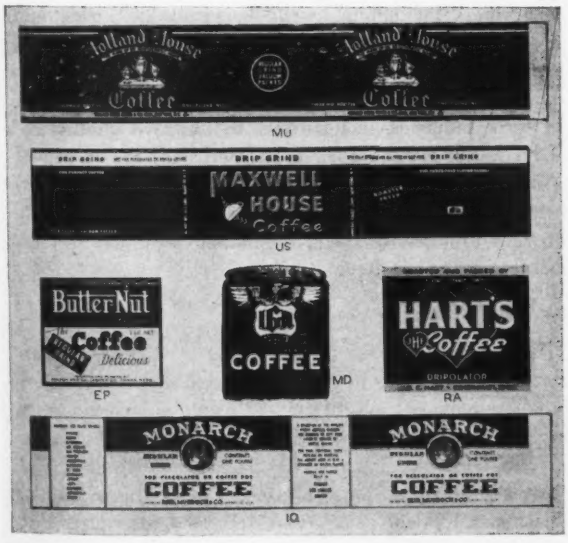
Among the things which may not be placed on labels for domestic use are representations of the flag of the United States or of any state. The Federal Alcohol Administration has prescribed a number of subjects which may not be depicted on any label for alcoholic liquors. (Fig. 21)

Trade practice conference rules—In some instances the Federal Trade Commission has approved trade practice conference rules establishing standards and labeling requirements for many products.

Quality standards of certain products are guaranteed

16—Coffee packed in metal or glass must be labeled to show the contents, grind and brand. Despite these requirements, the range of possible design is broad. 17—Tags and stickers are used to carry consumer information. The character of the merchandise, its form and texture, determine the design and method of attaching the label, sticker or tag.

16



17



by "Seals of Approval" furnished by *Good Housekeeping* magazine, the American Medical Association and by some trade organizations. Such approvals are limited in scope.

Standards—Labels which undertake to state or imply that products comply with *Federal* specifications should conform to the regulations of the National Bureau of Standards in regard to the language of quality-guaranteeing labels. If the National Bureau of Standards tests a device and issues a certificate applying to that device, the manufacturer may advertise (label) that fact, provided he does not create the impression that the National Bureau of Standards has tested and approved the manufacturer's line of products.

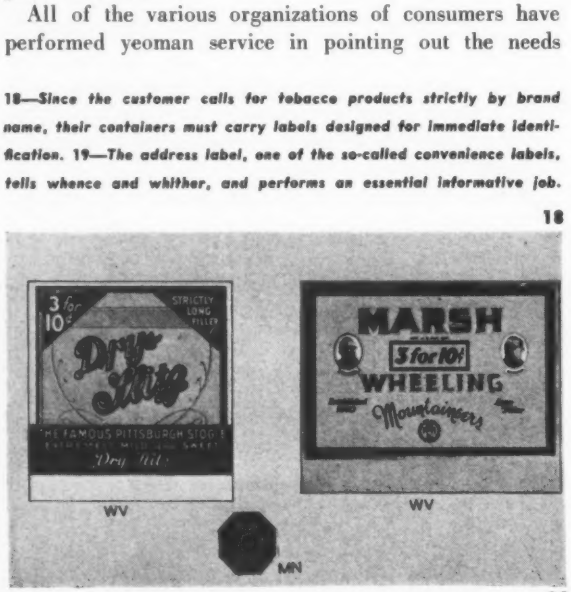
Protecting the consumer

It is fair to state that no movement toward better labeling can proceed far without the active interest and cooperation, if not the initiative, of actual consumers. The standardizing and defining of grades and qualities by official, quasi-official and purely voluntary organizations stems from the demonstrated need for better information and better understanding on the part of the consuming public as a whole.

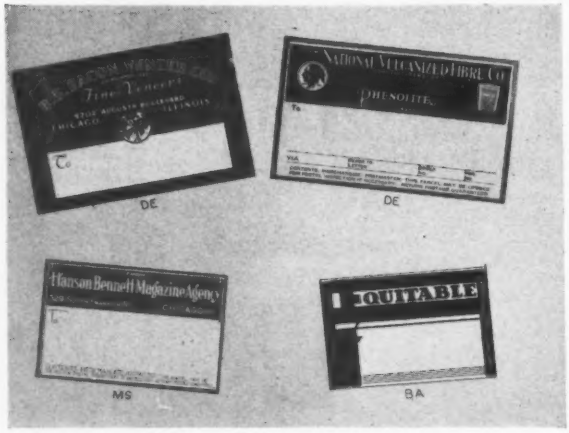
All of the various organizations of consumers have performed yeoman service in pointing out the needs which subsequently motivate the official determinations of standards made available by label declaration and honest advertising. The part taken by the Federal Trade Commission in preventing false and deceptive advertising claims has been of enormous benefit to the public and incidentally to the great body of honest distributors who find it difficult to compete with the inducements offered by unscrupulous competitors. Labeling is a form of advertising and, to the extent that the Federal Trade Commission has jurisdiction, both primary and concurrent, with other agencies, labeling standards may be the object of most solicitous care on the part of that governmental agency.

18—Since the customer calls for tobacco products strictly by brand name, their containers must carry labels designed for immediate identification. 19—The address label, one of the so-called convenience labels, tells whence and whither, and performs an essential informative job.

18



19



The genesis of label terminology

Labeling is a field of progressive study. The exploration of the definable qualities of goods, and the consumer's expectations with reference to such goods, leads to the adoption of semi-official standards which, if used as label terms, eventually acquire a legal meaning with reference to the qualities of such goods. At the same time, such exploratory investigations of definable qualities lead to simplification and standardization of terms, which, through their educational value to consumers, justify a reliance upon the goods so labeled. Consumer education in respect to definable qualities eventually leads to a genuine demand for the legal adoption of this kind of labeling terminology.

The qualities of food products are not static . . . they are improved and developed by scientific farming, selection, cross-breeding and other processes already developed or hereafter to be developed. Consumers' tastes change as they have the opportunity of becoming acquainted with better qualities and with the better methods of processing.

It would be most unwise to "freeze" a quality at any particular level by removing the incentive to produce higher qualities. Continuous research is an important factor in the development of more acceptable food products. The National Canners Association maintains for its members a fully equipped and staffed research laboratory where the definable characteristics of agricultural products are being constantly tested by every means known to science. In the final analysis, consumer acceptance is the test on which to base mass production which, in turn, influences enterprisers to improve quality and reduce price for the purpose of increasing the volume of production. This happens also to be the reason why enterprises insist on adequate identification and uniformity of their products which must compete with all other demands for the consumers' dollars.

Kinds of labeling

Every product has its own range of definable characteristics. Attempts to select groups of such qualities for labeling purposes emphasize the need for generic terms to define *kinds of labeling*. Appropriate adjectives are not easy to find, especially if they lack legal definition and must depend upon the slow process of public education. The Federal Food, Drug and Cosmetic Act requires that

"each definition and standard of *identity*, and each standard of quality, fixed and established for a food under Section 401 of the Act, contemplates that such food and all articles used as components or ingredients thereof "shall be *clean, sound, and fit for food*." Naturally a requirement that a food "shall be clean, sound and fit for food" is in effect a minimum standard of suitability for food purposes.

Since regulations under the Act have clearly defined the identity of most food products, the public knows that such food products are of *standard* grade without further qualification. Efforts to establish higher-than-standard grades are not necessary to protect the consumer against *unfit* foods.

For many years the packers of canned fruits and vegetables have offered higher-than-standard or premium grades, sometimes denominated by grade term, sometimes not. The premium products became known as "extra-standard," or "choice," or "fancy" grades. The Agricultural Marketing Administration, an agency of the Department of Agriculture, being authorized by law to establish grades of food products for certain purposes such as the pledging of goods for bank loans, undertook to define such terms by objective tests. AMA also established the alternative synonyms A-B-C which mean the same as Fancy, Choice and Standard and may be so construed wherever they are used on labels or in reference to such canned products.

Any canner may label his goods "fancy," "choice" or "standard" or A-B-C, or both, provided the goods are in fact equal to such grades, as officially defined. He may go even further, if he wishes to have his goods labeled with the designation "U. S." preceding the grade term, by arranging with the Agricultural Marketing Administration to have Government inspection during their processing.

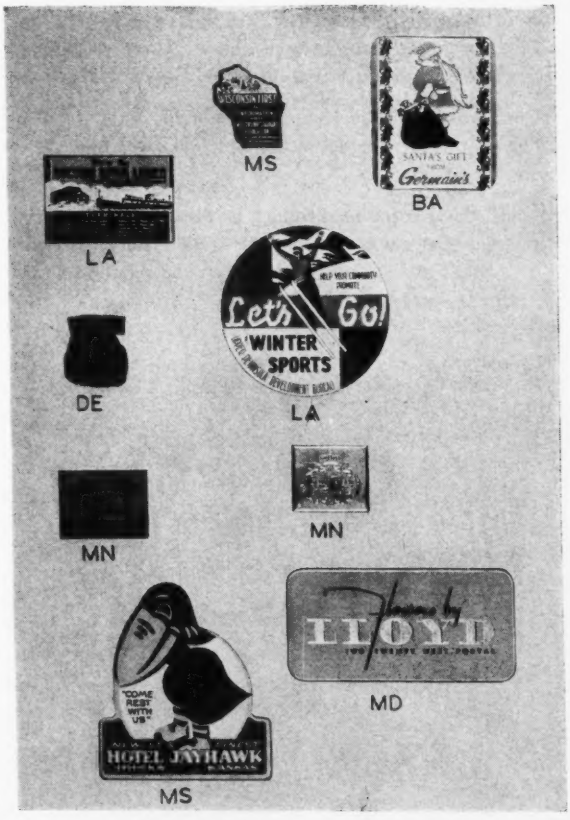
"U. S." grades

Inspectors of the Agricultural Marketing Administration of the United States Department of Agriculture have been located in certain canning factories under "continuous inspection," when requested by the canners who pay the cost of the service. Government inspection are on duty all the time the plants are in operation. Inspectors are furnished only to plants that are using AMA grade terms in the labeling of their products. All these plants meet certain requirements relating to housekeeping and sanitation. Only canned fruit and vegetable products packed in plants under the "continuous inspection" of the Department of Agriculture may carry the prefix "U.S." in connection with the grade designation appearing on the can. (Fig. 1)

Consumers can buy grade-labeled canned goods—with or without the "U. S." prefix. If the prefix is used, however, it means that the product has been prepared in a plant operating under continuous inspection, and that the inspector has certified the grade. If the prefix is not

20—Place names and suggestions of hotels to visit and places to buy are frequently advertised by means of stickers which have no other function.

20



21



21—Drugs and medicines are subject not only to many Federal regulations, but to a number of state laws as well. On their label statements, truth and complete accuracy are the desiderata.

shown, the grade statement means that the packer or distributor assumes the responsibility for the grade designation.

Helpful facts for the consumer

In addition to the label data required by law and regulations, there are many supplementary facts which are useful and helpful.

A food packer with a national reputation has made a careful study of the consumer's state of mind when approaching the problem of selecting canned foods. This study reveals that the following questions are most frequently asked:

1. What size can should I buy?
2. How many sizes are there?
3. What size can is this?
4. How many persons will it serve?
5. How may the contents best be prepared?
6. Does the product contain added sugar or salt?

This authority also suggests certain additional points which should be considered in connection with the preparation of a label:

1. If the particular product is packed in other size cans, list them all with the weight statement, etc., so that the consumer may select the size best suited for her needs.
2. When a particular variety, such as asparagus, peas, stringless beans, lima beans, etc., is marketed in different sizes under one brand name, a statement of this fact should be made, listing the different sizes available and listing their designations.
3. When a product, such as corn, is prepared in different styles, an explanatory statement should appear along with a list of the other styles of the product which are available.
4. Include at least one good recipe—a different one on each size can—and vary them as each run of labels is made.

For a distributor marketing a complete line of canned foods, this authority also emphasizes the importance of uniform composition and arrangement of subject matter. A consumer who becomes familiar with this pattern will be more likely to select other items in the line. Trade terms constantly repeated will eventually become familiar—for example, the numerical designation of can sizes, especially when accompanied by the weight statement furnishes useful information to the housewife.

Informative labeling of fabrics
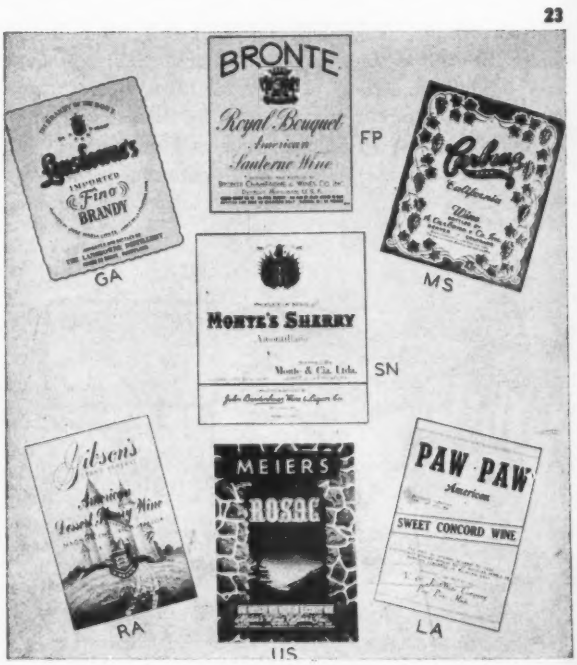
Among retailers, especially those dealing in fabrics and other non-food items, the term "informative labeling" has acquired a certain significance. The first requisite, of course, is that such labels shall conform to local, state and Federal regulations applicable to the particular product. (Fig. 26)

22



22—Liquor labels must comply with the rigid requirements of several government bureaus in matters of specific information. This doesn't stifle individuality, however, for liquor labels exhibit all colors, styles and shapes. No effort is spared in searching for artistic effects in this field. 23—American wines are growing in use. Their labels are designed with restraint or flamboyant color depending on the class of purchaser.

23





24

24—Labels for protective coatings, disinfectants and similar items must withstand the rough treatment of a long life. Especially during wartime, while substitute containers are used, labels for these products have heavy responsibility. 25—Labels for soaps and cleaning compounds must resist action of both alkali and water and must be adapted to many containers.

25



"Informative" labels will serve to emphasize the following points:

1. *What it will do (performance)*—Degree of color permanence; shrinkage or stretching; breaking strength; seam slippage; resistance to water, perspiration, wind, wear; light, heat and power tests; power consumption; cost of upkeep.
2. *What it is made of (composition)*—Kind and quality of fibre, metal, wood, leather, ceramics, cement, rock, fur, plastics, petroleum products, rubber, paper, bone, chemicals, drugs; ingredients of food products, etc.
3. *How it is made (construction)*—Size, weight, number of yarns per inch, weave, number of stitches per inch, finish, ply, cut, hand or machine made, pressed, molded, stamped, inlaid.
4. *How to care for it*—Detailed instructions for washing and/or cleaning; precautions to be observed in cleaning or storage; refrigeration; oiling and greasing; polishing; etc.
5. *Recommended uses*—Purposes for which it is most suitable; recipes; etc.

Color fastness in dyed textiles

The labeling of dyed textiles raises certain problems which are peculiar to this kind of merchandise. In recent years the interest in labeling has attracted national attention owing to the steps taken by the Federal Trade Commission to set up standards for textiles which will indicate to the consumer the exact degrees of color fastness of fabrics and garments. Extensive hearings have been held, in which manufacturers, distributors and consumers all have had a voice. While there has been disagreement on the phraseology and on the technical details, it is significant that throughout the hearings everyone agreed that informative labeling is serving a worthy purpose in educating the public to standards of quality.

It is readily appreciated that a color which is fast to washing is not necessarily as fast to light, or to crocking, or to other color-destroying agencies. Fabrics are designed for the use to which they are supposed to be put, and standards are set so that the fabric will last longer when put to its intended use. If it is used for some purpose other than the one for which it was intended, then full warning should be given that it may not be as serviceable.

What the informative label does

An authority on the use of informative labels or tags insists that a trade name is desirable for every product, or



26

26—The merchandising trend toward branding and trademarking of fabrics finds the paper label useful in giving information about products.

line of products. This authority, in discussing the benefits to be derived from the carefully planned use of informative tags, summarizes their various advantages as stated below. (Fig. 26)

The use of informative tags does these things:

1. *Establishes a trade name*—Since the name is on the merchandise at the point of sale, it sticks in the mind of both clerk and customer. The importance of establishing a trade name is further indicated by surveys which have shown that more than 50 per cent of retail sales may be due to the selling-power of a well-established name.
2. *Acts as a silent salesman*—Keeps the customer occupied until the clerk can serve her; saves the clerk's time by answering questions the customer must otherwise address to him.
3. *Trains salespeople*—Gives them the basic facts and strongest selling arguments—and phrases—concerning each product; is of especial help to the new salesman—and, similarly, facilitates transfers of clerks from slack to busy departments during holiday seasons.
4. *Gains the good will of consumer organizations* by presenting facts.
5. *Promotes correlated selling* by mentioning other items in the line.
6. *Cuts losses on returned goods*—Helps the customer make the proper initial selection; helps to eliminate returns due to improper use or care of an article. Oral instructions cannot really take the place of a written reminder.
7. *Re-sells the purchaser after the sale*—An informative tag on a product helps to maintain the state of mind that prompted the original purchase—a corrolary to the above.
8. *Meets legal requirements on marking*—When the law requires certain information on a tag, that tag might just as well also carry some special selling information with it.
9. *Combats vicious competitive prices*—A tag or label on better merchandise can justify the difference in price between the more costly quality products and competitive cut-price goods.
10. *Fosters step-up selling*—A customer will often willingly pay $3.98 instead of $2.98 if it is made clear that extra wear, extra satisfaction, extra comfort, etc., go for the extra dollar.
11. *Makes advertising more effective*—Reminds the customer, at the vitally important point of sale, of all the advantages stressed in other advertising. A tag fills the time-gap between the moment of reading a company's advertising and the moment of arriving at the decision to purchase—a gap which frustrates many sales.
12. *Helps the merchandise buyer*—He can classify the product in his line, and buy more intelligently. It may also show up unnecessarily numerous price lines, thus suggesting the elimination of some of these lines.
13. *Improves customer relations*—By infusing store customers with confidence in the performance to be expected from the article . . . provides a new means of interesting customers in what they are buying and provides striking evidence of the store's willingness to give the consumer facts about what the store is offering to him.
14. *The consumer benefits from informative tags and labels*—Firstly, anything which helps to reduce the cost of merchandising and selling is eventually reflected in lower prices to him. Secondly an informative tag or label which enables him to buy, use and care for merchandising more intelligently, conserves his income and raises his standard of living.

Label space as advertising

Label space used for mandatory statements is usually a small part of the available space which can be used profitably to praise the labeled product or to advertise other products sold by the same distributor. The space is extremely valuable because it works at the point of sale, assisting the merchant in arousing the customer's interest and favorable consideration (Fig. 12), After the goods are sold, the effective label space continues to exert a strong influence with Mrs. Consumer by stimulating the desire to use the goods and to benefit by such use. No product is fully "sold" until it is consumed. The bigger the label, the better it works, especially in the home where it confronts the whole family. This is notably true of the wrap-around style of labels on food cans and jars. Recipes and suggested food combinations take the foods out of the pantry and onto the family table. To quote one

27



27—On these can labels, high in consumer appeal, unmistakable pictorial illustration of the product is combined with a detailed description of the content in the text. The side panel of the can, as may be seen in these examples, has recently become a sort of overflow space to supplement the front panel information.

very level-headed authority: "The most satisfactory method for communicating information from manufacturer through retailer to consumer is a label attached to the product." This quotation is attributed to Mrs. Saidie Orr Dunbar, of the General Federation of Women's Clubs. Circulars or "outserts" that accompany the goods are in the same class as to attention-getting value.

Required statements use 10 per cent of space

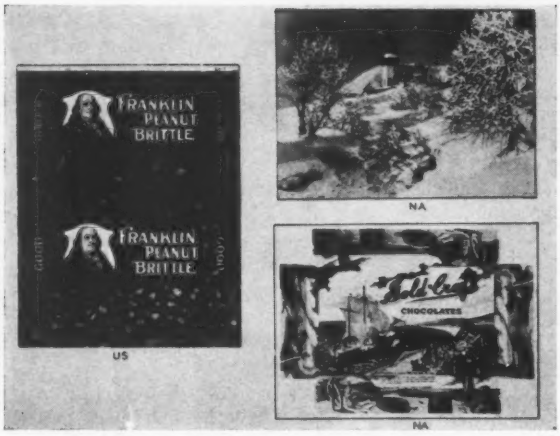
Legally, all parts of the label and of the circulars accompanying the goods are a part of the labeling and are subject to the same regulations in respect to their claims.

The required label statements need only a small amount of space—less than 10 per cent of the area of an average can label. The larger part of the space on can labels is exceedingly valuable as a medium to reach and influence the consumer. The packers of food products are especially forunate in the amount of label space at their command. The trend of distributive methods and the development of product descriptions have together operated to place the consumer in position where she expects the product to tell its own story, completely, truthfully and interestingly. That situation is not unwelcome to the dealers and the middlemen; they would rather handle a product that relieves them of responsibility; they would rather display and otherwise encourage the sale of goods whose labels obviously strive to interest and please the consumer and stimulate new sales.

Fourteen optional uses of free label space

In contrast to the few mandatory statements, it is interesting to note the wide range of permitted uses of label space. An examination of many labels now in use reveals at least fourteen ways to use label space to increase the prestige of the product. For example:

1. *Brand name*—Experience and tests combine to prove that the memory factor is most closely associated with the idea of a well-chosen brand name. For protection, brand names are usually registered in the United States Patent Office.
2. *Trademarks* are usually special designs which are used to identify all of the products which have been put on the market by a particular manufacturer and to relate the various items in a line.
3. *Vignette*—Next in importance as an aid to the memory or identification is a picture or vignette. Among certain classes of consumers, the picture is more of a memory factor than the brand name. (Fig. 1)
4. *Side panel*—The side panel of the can has recently become a sort of overflow-space to supplement the front panel of cylindrical containers. (Fig. 27)
5. *Background*—The background serves to contrast and enhance the artistic value of the label and may be used in an all-over design to visualize the product. (Fig. 1)
6. *Recipes*—Recipes have been found to serve the consumer's desire for suggestions of variety in the preparation of foods. It is possible to lithograph or print recipes on the reverse side of can labels. Visualized recipes are the natural-color reproductions of appetizing dishes prepared from the contents of the can (Fig. 27). In recent years, food processors have awakened to the great merchandising possibilities of their can and jar labels. Developments in the field of direct-color photographic reproductions have stimulated the interest and have made it possible to utilize the eye appeal which has so important a part in determining choice and se-



28

28—*The confectionary package utilizes labels which convey definite impressions while, at the same time, giving information about the product.*

lection. Recipe labels have been developed through the aid of authorities in the home economic and in the food fields.

Many vegetables and fruits are offered in appetizing and attractive servings, photographed in full color, and reproduced on canned food labels in various combinations along with the recipes for the preparation of such foods (Fig. 1). In addition to capturing consumer interest at the point-of-sale with a colorful display of attractive servings of food, recipe labels specializing in eye appeal maintain consumer interest at the point-of-use in the housewife's kitchen by showing her how to prepare at point-of-sale and appetite appeal at point-of-use, colorful recipe labels accomplish a two-fold stimulant to the sale of the product. They attract prospective buyers in the food store and influence repeat business by maintaining interest in the product and its possibilities.

Even under the present shortages and point rationing, the recipe labels are holding consumer acceptance and building good will for the product of the canners who use them. The proved merchandising power and sales-building value of this type of label point to an even more extensive use after the war.

7. *Back panel*—Other items in the line are mentioned on the back panel, sometimes accompanied by color reproductions of such items or of dishes prepared from such items.
8. *Novelty designing*—It has been found that foods for the very young are more acceptable if decorated with juvenile themes. (Fig. 1)
9. *Dietary claims*—If any product is represented as of value in correcting dietary or vitamin deficiency, it is subject to special regulation under the Federal Food, Drug and Cosmetic Act.
10. *Premium offers*—Coupons and prizes can be advertised on the labels. (Fig. 12)
11. *Special appeals*—Foreign languages are often used in addition to English on products that appeal to the foreign population. If any required statements are in the foreign language, all the required statements must be there in both languages.
12. *Awards*—Reproductions of exposition medals and awards for merit are often used to increase the prestige of the product. They must be genuine and in accord with the facts.
13. *Endorsements*—Seals of approval authorized by such organizations as the American Medical Association or *Good Housekeeping* magazine.
14. *Display labels*—Labeling for display purposes includes a two-way arrangement of text and picture, so that either upright or horizontal position of the can may be viewed equally well (Fig. 1). The development of self-service markets has brought to light some interesting observations about the mental reactions of women shoppers in relation to a display of goods; they will not pick up goods if the act is likely to disturb or disarrange the display; they will not touch a stack of goods that has the slightest appearance of instability, but they will pick up from a jumble of cans which are lying on their sides.

CREDIT—The illustrations in this chapter indicate by code letters the label manufacturers to whom credit is due for help in supplying representative samples. They are:

BA	Bartlett Label Co.
CA	Calvert Lithographing Co.
CR	Crocker-Union
DE	Dennison Manufacturing Co.
DR	Drug Package Inc.
EP	Epsen Lithographing Co.
FP	Fleming-Potter Co.
FX	The Foxon Co.
GA	Gamse Lithographing Co.
GE	Genesee Valley Litho Co.
GL	Grand Rapids Label Co.
IM	Imperial Lithographing Co.
IQ	Inland Lithograph Co.
LA	Lambooy Label & Wrapper Co.
LE	Lehmann Printing & Lith'g. Co.
MD	McCoy Label Co.
ME	Magill-Weinsheimer Co.
MG	McGill Lithograph Co.
ML	Michigan Lithographing Co.
MN	F. E. Mason & Sons
MS	Milwaukee Label & Seal Co.
MU	Muirson Label Co.
NA	National Color Printing Co.
PF	Palm, Fechteler & Co.
PH	Philipp Lithographing Co.
RA	Rainbow Lithographing Co.
RI	Ridgway Lithograph Co.
RM	Rocky Mtn. Bank Note Co.
RS	Louis Roesch Co.
RZ	Rossotti Lith'g. Co.
SL	Simpson & Doeller Co.
SN	St. Louis Lithographing Co.
ST	Stecher-Traung Litho. Co.
US	U. S. Printing & Litho. Co.
WL	Walle & Co.
WV	Wheeling News Litho. Co.

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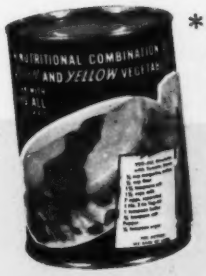






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Your label also must do a merchandising job at point-of-use by providing suggestions for serving your food product with EYE-PETIZED food pictorials and recipes. This use of the consumer panel will assure greater repeat sales for the product.

● The VEG-ALL label (shown above, left: front or display panel, right: back or consumer panel) created and produced at U. S. P. & L. for The Larsen Company, is one important reason why 7 out of 10 cans of mixed vegetables sold today are VEG-ALL. Yes, eye and appetite appeal provided by "U-S" EYE-PETIZED labels pays off in sales results. Now is the time to give consideration to the merchandising value of your label. Consult "U-S"—creators and producers of packaging materials of proven sales appeal. Call or write for a "U-S" representative.

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ADHESIVES AND ADHESIVE TAPES

Technical aspects of adhesives 332

New developments in adhesives 341

Resin adhesives 342

Equipment for applying adhesives 344

Heat-sealing principles 348

Adhesives for heat sealing 354

What to tell your adhesive supplier 355

Adhesives for weather-proof cases 356

Types of gummed tape 357

Pressure-sensitive tape 358

Tacky-tape dispensers and affixers 360

Chart: Adhesives — types, properties, characteristics opposite 356

Technical aspects of adhesives

by Dr. F. C. Campins

Basic principles governing proper selection and manipulation of adhesives should be clearly understood by all concerned with the shelf life of the package, or with various other day-to-day packaging problems involving glues, and their applications.

An adhesive is a material in liquid or soft plastic condition for purposes of application, capable of changing to a semi-solid jelly or to a hard film of high cohesive ability and suitable bonding power.

A good bond between two surfaces means, in general, that the fabric or the material must be torn or lifted if an attempt is made to pull the surfaces apart. This naturally depends on the materials treated (see Table III, on chart opposite p. 356). Fibres of certain papers being easily torn, the adhesives may be low in tensile strength and still give a fabric-tearing bond, whereas the same adhesive, used between two pieces of bond or parchment paper, may be unsuccessful.

Responsibilities of the adhesive

In addition to bonding the surfaces so they will stand up under the field requirements of package life, climatic variations, etc., the adhesive must permit ready operation in the applicator and must develop a preliminary bond at a sufficiently *rapid rate to permit maximum machine efficiency*. The initial cost of an adhesive seldom amounts to 1 per cent of the cost of the finished product. For this reason the adhesive should be selected only in the light of long term economy as reflected by increased production, decrease in waste, more satisfactory quality and other similar considerations.

The figure, p. 333, shows how the adhesive manufacturer arrives at a commercial recommendation, at all times basing his choice on the ability of the adhesive to meet its responsibilities. Further, if only one or two adhesives are available for some very unique surfaces, then clearly, if the job is to be materialized at all, these products would have to be used, even though that may mean compromise in or relief from other requirements. Thus, on new developments, the combined cooperation of the package machinery builder, the paper or sheeting supplier, the adhesive manufacturer and the production manager should enable the several requirements to be adjusted for the attainment of ultimate success in the final product.

1—*Adhesives have played new packaging roles in highly specialized protective containers developed to deliver food, drugs and ammunition to all parts of the globe during the war. Many of these applications point the way to progress in postwar packaging. Photo, U. S. Army Signal Corps.*

1



Each successive zone shown in Fig. 2 should be considered to develop the viewpoint and perspective that will lead to efficiency in the day-to-day use of adhesives.

Types of adhesives and types of adhesion

Referring back to the definition given above for an adhesive, several features all important to the user of adhesives are brought out as follows:

At Application		In Final Bond
For activitation or prebonding usually in the gluing mechanism		After fully adjusting itself to room conditions
The Adhesive is		The Adhesive is
Liquid or Soft Plastic and Has Flow	Changing to	(Semi) Solid Lacks Flow
To permit its application in a thin film		to achieve a permanent bond

The operator is concerned *not alone with the application,* but also *with the initial stages of bond formation (preliminary setting)* whereby the freshly bonded package may be handled even though the adhesive may take a more or less considerable time to adjust itself fully to its surroundings.

It is also obvious that the extent of *preliminary setting* required of an adhesive *will vary* from job to job; in fact, in some elementary cases the "initial tack" of the adhesive is sufficient. Also, as the requirements at application are usually diametrically opposite to those at preliminary setting, all possible provision should be made at the application stage to facilitate or expedite setting.

To play these stages against each other properly it is necessary to know the *means by which adhesives change from the liquid to the solid state.* Thus:

The Mechanisms of Setting } or { The Methods by Which Adhesives change from the Liquid to the Solid State } are by { Change of Concentration of a Volatile Liquid Ingredient } &/or { Change of Temp. } &/or { Change of Chem. Comp.

These processes serve to classify adhesives (see Table I, insert chart, opposite p. 356). Thus:

All Commercial Types of Adhesive } are { "Solvent" Adhesives } or { Cements Temperature Sensitive Cements } { Chemical Cements

There are no sharp boundaries between the types and often one or several of the methods of setting may be exploited; thus the real job of successful application always keeps the setting process clearly in focus in order to secure the maximum rate of setting.

Both these types of adhesives develop final bonds between the surfaces that fall into two classes. (See Table II, on chart opposite p. 356):

1. Where the adhesive film finally sets in a plastic mass, usually pliable; this is called a *plastic bond.*
2. Where the adhesive film finally sets into a hard glassy material which may break when the bond is bent, but which continues to supply a film *across* the surfaces, being anchored into or between the fibres, forming a *penetration or mechanical bond.*

There is an interrelation between these two types of adhesion, because all adhesives in the preliminary setting stage give a plastic bond. Thus, many cold vegetable adhesives, after sufficient (preliminary) setting to hold the surfaces together, make a plastic bond which, in those cases where the adhesives finally dry out to a hard, brittle condition, must be replaced by a penetration bond. These conditions are shown in Fig. 3, p. 335.

Capabilities of adhering

Adhesion generally occurs between the surface layers. Therefore the adhesive bond should not be held responsible for failures due to discontinuity of structure, cracks, zones of low tensile strength, etc., below the surface.

In some cases it is possible to work through this false, unreliable or difficult surface by dissolving or melting it away through the adhesive, but this slows the process.

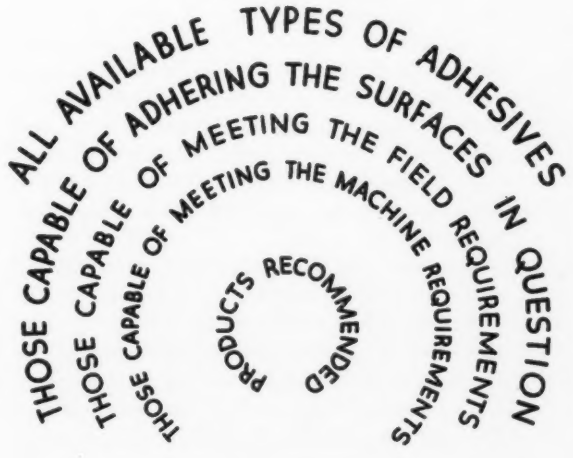
The adhesive should wet the surface to which it would subsequently adhere.—This is necessary not only to spread a thin continuous film, but probably also to establish whether or not those affinities exist which seem absolutely necessary to effect permanent bonding.

The adhesive must preserve continuity across the surfaces to be bonded.—(If it also preserves continuity along the surfaces, it may have added value for developing greaseproofness etc. However, this is not necessary for adhesion.) This means that:

1. The surfaces should be brought together while the film of glue is active (i.e., liquid, semi-solid or soft plastic), and in general held together until the semi-

Figure 2

RESPONSIBILITY DETERMINES THE RECOMMENDATION



RANGE OF CHOICE IS NARROWED BY EACH SUCCEEDING ZONE OF RESPONSIBILITY UNTIL THE CENTER OF RECOMMENDATION IS ARRIVED AT.

solid condition has developed in the glue film, so that it can successfully overcome the tension that may be imposed due to resiliency of the flaps, etc.

2. The adhesive should not be a crystalline but rather a colloid type of material.
3. Porous or absorbent surfaces necessitate controlled penetration of the adhesive between the instant of application and the time when preliminary setting occurs; that is, the properties of the adhesive must compensate as a counterbalance for the properties of the surfaces. (See Fig. 4, p. 336.)

The adhesive bond must have a tensile strength equal to or greater than that of either of the materials bonded.—Thus, the strength of adhesive is keyed to that of the material. In other words, an animal glue of high tensile strength when used to join paper together cannot possibly develop a stronger bond than the strength of the paper—or any adhesive used to join metal to itself cannot possibly develop as strong a bond as the metal because no known adhesive is that strong in itself.

Thus, under ideal conditions where the two freshly adhered surfaces are kept (under pressure) in tension-free contact for a prolonged period these generalizations guide us in evaluating their capability of adhesion, but even under these conditions, the failure to adhere, called *final failure*, will sometimes occur. *The causes of final failure can well be examined at this time.* (These must naturally involve violations of the generalizations.)

Common causes of final failure

For "solvent" types—These are products made liquid or semi-liquid by the presence of volatile liquids used to dissolve and/or suspend the adhesive ingredients. These liquids must be largely removed to achieve setting or bonding, and the *final failure* of "solvent" types is mainly tied in with the "solvent." Failures may be caused by:

1. *Inability to lose solvent*—This would lead to non-setting and so to final failure and can be caused by:
   (a) Both surfaces being impervious to diffusion of the solvent. Here the adhesive would never dry. (See Table III on chart opposite p. 356.) This explains why at least one surface should permit diffusion or be porous. A remedy sometimes used where both surfaces are impervious to the volatile solvent is to *temper* or allow evaporation of the solvents before bringing the sheets together. This is particularly effective where the adhesive develops a high lingering tack and is of a plastic nature. This expedient is often used in handling transparent tissues.
   (b) The surroundings and the materials to be adhered being already saturated with the vapor of the "solvent" and so unable to remove solvent from the adhesive. The commercial equivalent is the frequently overlooked fact that in an atmosphere fully saturated with moisture (i.e., constantly at 100 per cent relative humidity) cold aqueous adhesives would be largely useless as they would not set and might penetrate excessively.

2. *Shrinkage on drying from loss of the volatile solvent*—This factor is unnoticed where one of the surfaces is pliable and can follow the shrinking glue film. Where the surfaces are rigidly separated, the forces set up by shrinkage often disrupt the glue film and lead to failure of the bond. (This is sometimes incorrectly referred to as "crystallization.")

3. *Excessive penetration due to excessive solvent*—As the body of the adhesive may be varied by regulating the amount of solvent, its dilution should be held within certain limits to avoid excessive penetration between the time of application and the setting or bodying-up of the product to a degree sufficient to stop penetration. The slower setting glue as a class are generally used with heavier bodies to compensate for this. All the factors come into evidence when these adhesives are used on porous surfaces. (See Fig. 4.)

4. *Temperature limits in storage and use due to solvent*—The adhesive should be stored and used within the proper temperature range where the solvent is liquid.

5. *Solvent action on the sheeting, inks, etc.*—Often some of the liquid ingredients in the adhesive exert action on the stock, ink, etc., which makes the adhesive unsuitable for the job. Such effects include:
   (a) *Blocking:* Here the adhesive solvents partially dissolve and so soften the sheeting as they seep or migrate through it. This partly dissolved sheeting by becoming soft and sticky, tends to adhere to other sheeting packed in close contact.
   In aqueous adhesives, e.g., envelope gums, moisture reactivation achieves the same result, sticking together of the units, or "blocking."
   (b) *Bleeding:* Here the solvent, which may go through the sheeting either by diffusion or by solution, attacks the inks or colors, causing them to fuzz, run, blot, stain, or show through. This is particularly likely to happen when the solvent is not very volatile and has a strong affinity for the sheeting (as this usually means a rapid rate of diffusion).
   (c) *Blisters:* Too active a solvent or swelling action on the sheeting, causes bulging or blisters.

6. *Inadequate penetration of non-plastic types*—If one of the faces does not permit of a penetration bond into or between the fibres, then, where the adhesive dries out to a non-plastic substance, bond failure will occur at this face (see Fig. 3) and the glue film will pull away therefrom while adhering to the other face.

For cement types—These are adhesives that change from the liquid to the semi-solid state without loss of solvents (analogous to solder or Portland cement). They can therefore set on non-porous or vaporproof surfaces. The final bond may be of the plastic or the penetration type. Thermoplastic adhesives generally give *plastic* bonds, and failures of this class of bond generally are:

1. *"Cold Flow" Failure*—While the plastic adhesive should ideally have a yield point greater than any constant tension to which the bond is exposed so as not to flow, in practice the yield point is often below this and so the product behaves as a viscous liquid and exhibits flow. Thus where the final bond is under a continuous tension, failure may occur through

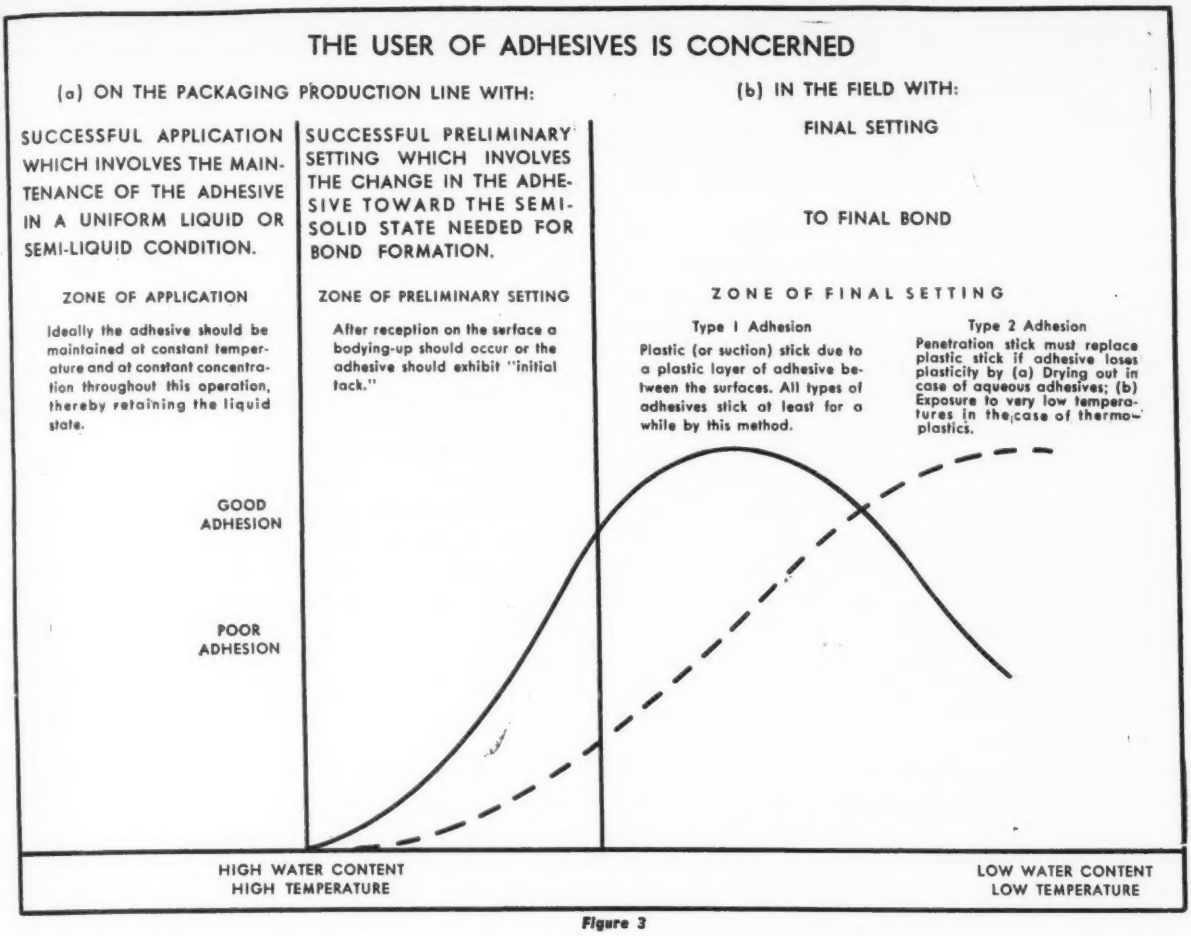


Figure 3

this tendency to flow. This effect is more pronounced in warm weather.

2. *Embrittlement Failure*—The (plastic) adhesive may, under certain conditions, lose its plasticity and exhibit low tensile bond strength due to the loss of the plastic or suction bond and/or to the embrittlement of the adhesive. Thus thermoplastic cements often exhibit embrittlement at low temperatures and so fail. Whereas in chemical cements, as the products may set to a hard glassy material, a penetration bond must be established (either into or between the fibres of both surfaces) before final setting occurs. Naturally in this case, the tensile strength of the set cement should be sufficiently high to tear fibres.

Manipulative recommendations for the user

Granted the proper recommendation in terms of the responsibilities of the adhesive by some reputable manufacturer, there still remains the problem of manipulation of the adhesive to assure a good final bond. These factors are divided into three categories, related to:

1. The adhesive itself
2. The mechanism for the application
3. The surfaces to be bonded

Factors concerned with the adhesive are:

1. *Temperature of glue*—Cold glues should be at room temperature before dilution, as products chilled by exposure to low temperatures would be unduly heavy and so induce the user to add more water than is necessary.

Heat will thin out most glues, so that the proper working consistency can be attained with reduced dilution in summer, or even with no dilution where the glue pot is heated. In fact, heating the glue pot often provides a simple method of speeding up the setting of the adhesive.

2. *Dilution*—If adhesives are thinned beyond the limitations outlined by the supplier, the solids in the glue will be carried too deeply into the stock leaving an inadequate film between the surfaces to provide a proper bond. In other words, excessive dilution will destroy the continuity of the film which is essential for adhesion. On the other hand, insufficient dilution may lessen the degree of penetration which is necessary to secure anchorage. Therefore, dilutions should be accurate.

It is, in general desirable to agitate the adhesive prior to adding the diluent so as to get a true picture of its consistency under operation. Only then should the diluent be added with continued agitation.

3. *Care and storage*—It is advisable to keep the container covered to avoid any thickening by evaporation, or any contamination by dirt. It is always advisable to store the containers at operating-room temperature. In winter, apparent heaviness of the adhesives is due to cold;

so, before dilution, products should be brought to room temperature. It is also undesirable to store products near radiators as this will cause thinning out and promote evaporation of volatile solvents.

Mechanism of application—This should permit effective transfer of the adhesive in an adjustable thin film from the glue pot to the surface (or surfaces) being bonded. This involves:

1. *Maintenance of consistency:* To ensure proper mechanical operation and ready transfer of the adhesive, the body or consistency of the adhesive in the glue pot must be kept within a given range. As the glue thickens in the pot through evaporation, it should be thinned, preferably with a special dilute glue mixture. This can be prepared by thoroughly mixing one part of glue with two parts of solvent. For any glue that contains volatile solvents, a cover is desirable to retard thickening through evaporation.

When the body of the adhesive is regulated by temperature, e.g., where glues are applied at temperatures above that of the room, overheating will cause excessive thinning, which results in splashing. Other harmful effects are burning and decomposition. Again undue cooling will usually cause a rapid increase in body with consequent soiling of the machine. To hold the temperature of the glue substantially constant, and thereby obviate localized overheating, the glue pot should be jacketed with water or some other liquid which is kept hot by a thermostatically controlled heater.

2. *The applicator should have* true surfaces to assure uniform transfer to the desired area. This may mean periodic cleaning of the surfaces.

3. *The applicator should provide* means both for regulating the thickness of the film and for ensuring uniform thickness throughout the film. Adjust thickness of film for the regular production rate of the machine.

The surfaces to be glued should:

1. *Come into uniform contact with the applicator* to effect proper transfer of adhesive. This means that surfaces must be true.

2. *Receive a thin, uniform film of the adhesive* from the applicator.

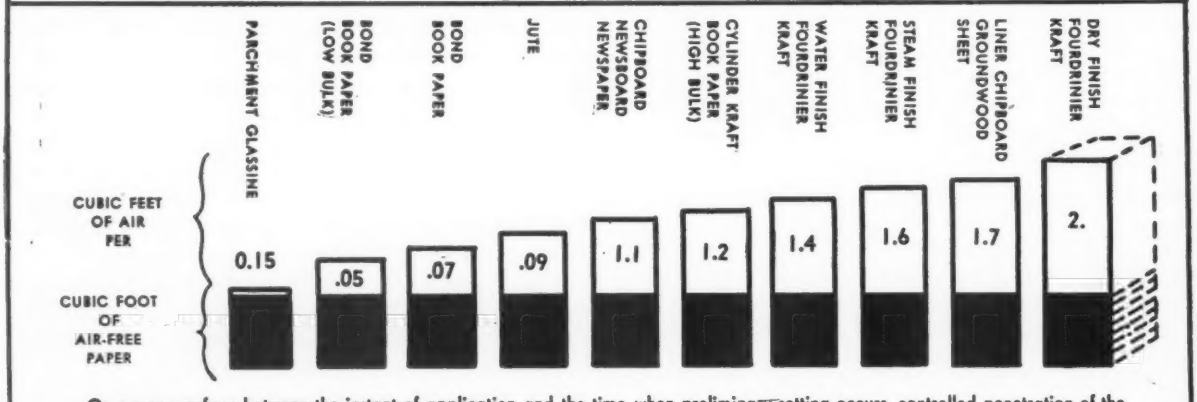
3. *Come into uniform contact with the surfaces* to provide a thin, uniform film of adhesive.

4. *Be held in a strain-free condition* after contact is established (as in 3) by some device, such as a compression belt, until the adhesive has set sufficiently to effect a bond across the surfaces and so permit the handling of the package. When this bond has fully dried or adjusted itself to room conditions, it should be slightly stronger

Figure 4

GENERAL CORRELATION BETWEEN ADHESIVES AND STOCK FOR AQUEOUS ADHESIVES

	TO ACHIEVE CONTROLLED PENETRATION AT TIME OF APPLICATION	
	PENETRATING ADHESIVES GENERALLY PREFERRED	FILMING ADHESIVES GENERALLY PREFERRED
PENETRATING TYPES OF ADHESIVES ARE GENERALLY USED AT	MODERATELY HIGH BODY	VERY HIGH BODY
FILMING ADHESIVES ARE GENERALLY USED AT	VERY FLUID BODY	MODERATELY HIGH BODY



On porous surface between the instant of application and the time when preliminary setting occurs, controlled penetration of the adhesive must enable it to stay on the surface.

NOTE: The above diagram would seem to emphasize porosity, but it must be remembered that penetration bonds are attainable even on glassines or parchments indicating a penetration into the fibre. This is brought out in Fig. 5 where mechanism of setting is discussed.

than the materials bonded so as to make it fabric-tearing.

5. *Generally be at room temperature and adjusted to room conditions.* To avoid trouble with cold stock, it is advisable to store it under operating-room conditions.

6. *Be of seasoned stock.* Damp or green stock (or even seasoned stock in unduly damp weather) tends to slow up operations. Stock should be supplied from storage properly seasoned.

Meeting field conditions

General requirements—The adhesive supplier, through long experience, knows that his product must meet field conditions after a satisfactory bond is accomplished under room conditions. These hazards, which include simple aging, exposure to extremes of climate, humidity and moisture, exposure to grease, etc., are discussed below.

Conditions that develop flow failure—The redevelopment of excessive flow will lead to bond failure if the adhesive:

1. Slowly yields to any constant tension, or

2. Continues to penetrate or migrate into a porous face, destroying film continuity by *excessive penetration* across the surfaces. Further, as adhesives are often merely physical mixtures of ingredients, these may not all necessarily migrate at the same rate. This leads to:

3. Loss of bonding characteristics, embrittlement, etc., by partial migration of one or more of its ingredients through a relatively non-porous surface at a greater rate than the others. Here the products that remain behind are in themselves unsatisfactory for bonding.

The common climatic conditions that bring about this flow affect many types of aqueous adhesive and include:

High Temperature—Thermoplastic types will often soften unduly as will most other plastic adhesives. Where the bond is under a small but constant tension, the viscous flow of the adhesive ultimately will cause it to yield. The same condition occurs at a decreased rate at room temperature. Examples are:

1. Where a thermoplastic adhesive is used for sealing the springy or resilient flaps of a shipping case or carton, failure will in general occur slowly, especially in hot summer weather.
2. Where glassine is laminated to itself or to board with a thermoplastic adhesive, such as amorphous wax, and then this combined sheeting is adhered face to back with a non-plastic aqueous adhesive, blisters or zones of separation will often slowly form in the wax due to the constant shrinkage-pull exercised as the aqueous adhesive dries out. This effect would be minimized by the use of a plastic aqueous glue or a hot flexible glue. On porous surfaces excessive penetration may also occur.

High Humidity—As aqueous adhesives (which do not exploit chemical setting) use water as a means of dispersing and/or dissolving some or all of their ingredients, it is at once apparent that water as well as high humidity should exert some effect upon the final bond.

Although aqueous adhesives use water to render them liquid, they often have only a limited affinity for moisture vapor. Thus most case sealing glues once dried will remain in the solid state even at 100 per cent relative humidity, when they may in some cases pick up only, say, 10 to 14 per cent moisture, permitting shipments to the tropics.

Other aqueous adhesives may have various hygroscopic or moisture-absorbing ingredients added thereto to secure bite, plasticity, etc. These may draw sufficient moisture from fully saturated air to partly or wholly liquefy. Flow failure will then occur in the three manners listed above.

Type 1. Will usually take place under tension.

Type 2. Shows the general undesirability of using hygroscopic adhesives on porous stocks, because excessive penetration at high humidity is a menace.

Type 3. Here the damp surroundings may cause migration or seepage of the hygroscopic ingredients. This sort of failure is prone to appear on surfaces of low porosity where some of the hygroscopic ingredients, attracted by the moisture in the stock, travel away from or ahead of the adhesive into the sheeting.

This condition is noted in the "dislocation" caused by some envelope gums on bond papers, where the migrating ingredients may cause a color change in the paper due to its acidity, etc. These materials may exert a deleterious effect on the sheeting. Another aspect of this is that the high humidity literally reactivates any exposed adhesive.

Low Temperature (at high relative humidity)—This case is included for completeness; but here, even though the adhesive will absorb its quota of moisture, the low temperature will usually keep the viscosity of the adhesive sufficiently high to obviate the trouble from excessive penetration. (Also see temperature embrittlement.)

Actual Wetting—This will actually remoisten the aqueous adhesive and so promote partial or total penetration as described above. A common unsuspected case is the sweating that occurs if moisture is deposited in closed freight cars when their temperature drops off at night; after the interior of the car has previously developed a high R. H. during the hot daytime temperatures due to materials that give off moisture vapor.

Causes of loss of film characteristics

This heading covers a multitude of conditions. It will be noted that failure may be due to surface or stock, as well as to the adhesive. We shall discuss here the more common types of failure.

1. *Bond embrittlement or "crystallization"*—This embrittlement of the bond may be due to physical and/or chemical causes, and both stock and adhesive should be examined for responsibility. Thus:

"Aging" or migration failure paralleling the migration of hygroscopic ingredients is commonly found in the bonding of certain transparent tissues where the affinity existing between certain liquid ingredients of the adhesive and the stock can slowly cause their migration. The resulting embrittlement of either the film of glue or the sheeting itself, called "aging failure," is usually a slow process requiring many months. To be quite safe commercially the estimated life of the package in the field should be well within this period. *(Continued on next page)*

Two causes of troubles are: Migration of the plasticizer away from the adhesive into the sheeting. This may result in embrittlement of the glue and so to failure of the plastic adhesive bond. Also migration of the plasticizer away from the sheeting into the glue, resulting in a loss of pliability of the stock. It should be noted that the plasticizer, usually a non-adhesive liquid ingredient, should remain in the adhesive to assure plasticity in the final bond. Ideally the plasticizer should have no effect on the sheeting, but it often has some solvent action.

2. *Temperature Embrittlement*—These are a few possibilities:
   a) Sometimes only very limited amounts of migration occur in the process of setting, but these ingredients may be of a kind that would cause subsequent embrittlement of the stock or adhesive if the adhesive bond were subjected to heat. A typical case is where hot cement or fertilizer is packed in paper bags.
   b) Loss of tensile strength may occur from a variety of causes affecting the adhesive or the stock. Certain water-insoluble adhesives still may swell on prolonged submersion in water. Thus an adhesive bond made with this may, on prolonged submersion, lose tensile strength as the adhesive picks up water and swells even though it is still a solid. In other cases the stock itself may lose strength at high humidities and give a deceptive merit to the adhesive.
   c) Rupture away from the surfaces in general is often due to differential expansion, i.e., the adhesive film and the stock expand at different rates under the field conditions and this destroys film continuity across the surfaces.

When the bonded surfaces are immersed in hot wax, bond rupture could well occur through this cause, possibly aided by embrittlement.

When the bonded surfaces are immersed in water, differential expansion under moisture may cause rupture. Thus where two sheets of parchment are adhered with a non-aqueous adhesive—which is also water-insoluble—it may at first appear that this bond would stand prolonged submersion. In most cases it does not, because the parchment expands on submersion while the glue film does not—resulting in rupture.

The same point is well illustrated where a label is applied to a bottle with a non-aqueous adhesive and is then allowed to dry. On submersion, the label applied in this manner generally will come off.

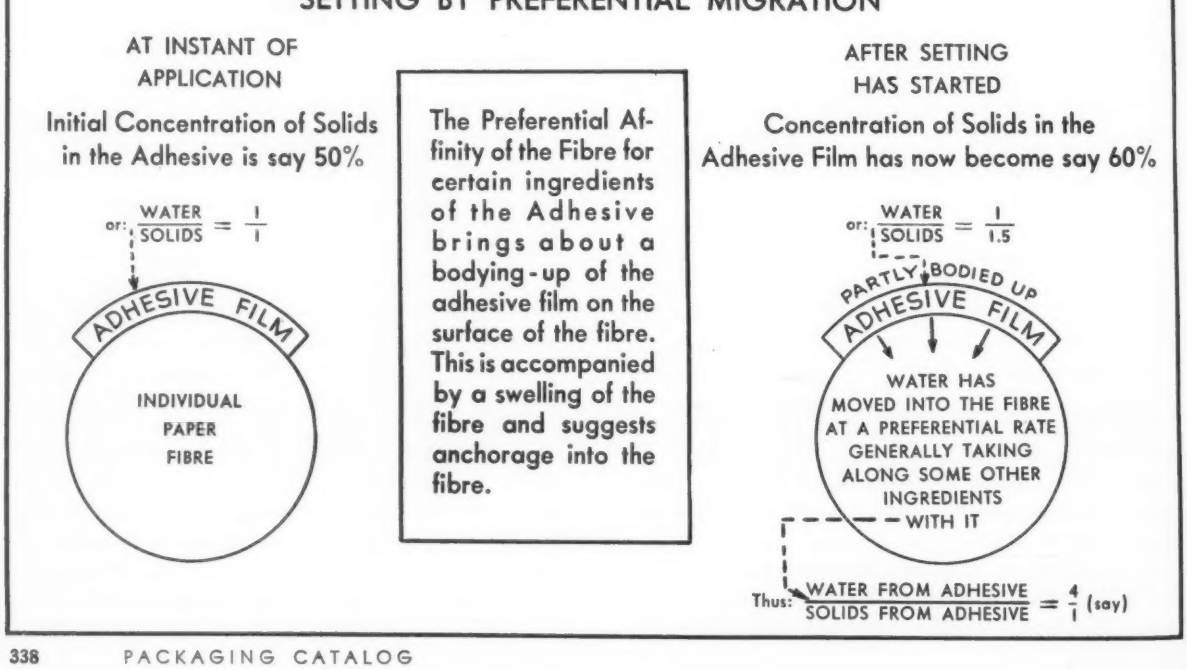
These general examples will illustrate the high spots of field failure. These considerations form an essential part of the decisions of the responsible supplier to whom the consumer should carefully point out the probable field history of the package.

Meeting machine requirements

Uniform liquid condition is necessary for proper application. Further, because the adhesive may need more or less time to achieve the right degree of "preliminary setting" for bond formation, it is helpful to have a prolonged tension-free contact between the freshly bonded surfaces to allow for the setting, making no mechanical demands upon the adhesive until this preliminary setting is accomplished.

However, in the interest of ensuring bonding under the most adverse conditions, a longer time for the package under pressure in the sealing machine is very desirable. This does not necessarily mean slower production. It also can be achieved through a longer compression line.

Figure 5



The major consideration desirable for wide versatility in the selection of adhesives are (see Fig. 6):

1. Negligible evaporation during application
2. Negligible temperature change in application
3. Negligible mechanical responsibility prior to preliminary setting
4. Prolonged tension-free contact period between the freshly bonded surfaces.

Types of applicators

No attempt is made in this article to do more than explain the theory and principles underlying various types and mechanisms for applying adhesives. (The practical aspects and illustrations of actual devices are presented in the article, *Equipment for Applying Adhesives*, p. 344.)

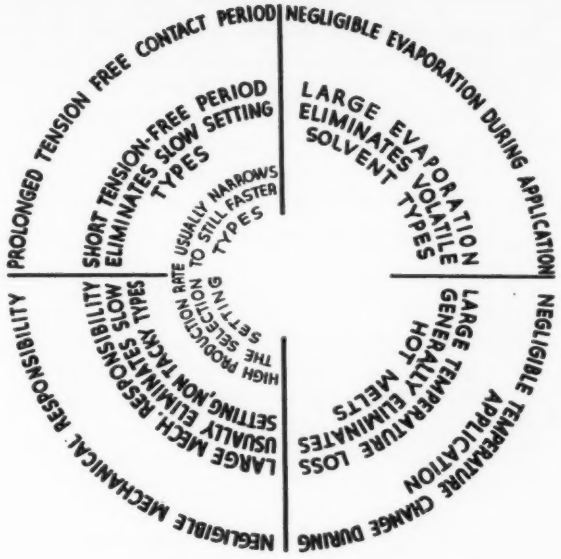
The several types of glue applicators fall in three classes: (a) direct application (b) direct transfer (c) translatory (or indirect transfer).

This method of viewing an applicator in terms of its major type is of particular value in approaching new projects, as it enables a wide selection in terms of the broad types of adhesives that can be handled by that applicator. In doing this, stress should be placed on the evaporation and temperature-change factors. It should also be noted what measures could be provided partially to reduce mechanical responsibilities as well as to increase the tension-free contact period.

This approach may enable the operator to make the most of his equipment on new developments. Thus for a unit turning out a flat or folded package, e.g., bag, box, etc., if the mechanism can turn out the properly folded flat package and deliver it under a compression belt without having any adhesive whatever in the glue pots, then clearly either a slow or fast glue is suitable—the limitation of the contact factor being overcome by stacking.

Taking the three main types of applicators it will be noted that:

1. Direct applicators can usually be readily protected against evaporation of solvents by a slotted cover; the glue roll partly projecting through the slot. Further, as the sheeting comes into direct contact with the roll that rotates in the glue, if the pot is heated, there is little undue loss of temperature in the applicator. Thus hot glues (hot melts, etc.) are permissible on these units. In general, therefore, this type of mechanism allows a wide choice of adhesives.
2. Simple transfer, in contrast to the direct applicator, permits "spot printing" of the adhesive while the web of paper is in continuous motion. It will readily be noted that this mechanism ordinarily allows a fair amount of evaporation and if the adhesive in the pot is heated, by the time it reaches the unheated segment of the transfer roll, there is an appreciable drop in temperature. These factors restrict the use of hot melts and of adhesives which have extremely volatile solvents.
3. Translatory (or indirect) transfer provides great scope for evaporation of solvents as well as for cooling the adhesive between a heated glue and the surface receiving the adhesive. Thus, pot glues, and volatile solvent types are usually out of the question. Further, the adhesive in the applicators frequently has mechanical duties to perform which in themselves may call for a tacky as well as a fast setting glue. Thus, choice is greatly restricted.



HOW EACH SUCCEEDING MACHINE REQUIREMENT NARROWS RANGE OF CHOICE UNTIL CENTER OF RECOMMENDATION IS ARRIVED AT.

Figure 6

The above perspective is useful in the development stage of packaging so as to obtain the full benefit from the versatility of the applicator. However, in contrast to this, where a given operation is standardized the objective is to select the *specific* adhesive which will yield the most fruitful union with the machine and stock in the form of efficient and foolproof day in and day out production which is geared to be compatible with the field requirements.

To accomplish this, the same pattern for the elimination of types of adhesives is followed—but now, with the other factors standardized, each zone of responsibility is carefully scrutinized so as to discover the particular strategic aspect which must be favored and it is this aspect which will focus the decision.

All of this sounds complicated, but great assistance is generally given by the equipment itself which, when used with the wrong grade of adhesive, is eloquent in a protest that points to the strategic requirements. Further, if the unit has been in operation for a while, the operator becomes keenly aware of those spots that are always demanding attention and where these are linked with adhesives the final formula adjustment of the adhesive has to cater to relieving these barriers to efficiency. Here, too, the reputable adhesive supplier can be very helpful by recognizing these factors promptly and so narrowing his recommendations. (*Continued on next page*)

After arriving at a decision on the proper adhesive, the next issue, and the one of great concern to the operator, is how to use it to best advantage. This usually means how to secure the most favorable rate of preliminary setting. Before going into the manipulative procedures to accomplish this, the mechanism of setting should be discussed so that the operator can appreciate the reasons for the subsequent recommendations.

Mechanisms and rate of setting

On the production line, the requisite extent of preliminary setting which must occur within the time of tension release (i.e., the time of tension-free contact between the freshly bonded surfaces) provided by the mechanism, determines the rate of whatever preliminary setting may be required.

Thus where the time of tension release appears inadequate or where the adhesive is not exhibiting a rapid enough rate of preliminary setting, relief may be had:

1. By reducing the total tension on the bond (more effective scoring, different gain direction, etc.)
2. By increasing the area glued off
3. By making provision to increase the "setting rate" of the adhesive (by manipulation of the adhesive, the stock, etc.)
4. By providing a longer time of tension release through longer compression, or stacking time.

This again shows how the problems of adhesion are closely inter-related with other aspects of packaging.

The three basic methods by which adhesives change from the liquid to the semi-solid state may be outlined in the following manner:

I—Increase in concentration of solid ingredients:

This increase in the proportion of solids to solvent which causes bodying up may be brought about by the following conditions:

1. *Partial evaporation of the "solvent"* (which usually accompanies "tempering") prior to bringing the surfaces together. As this evaporation of solvent from the freshly gummed-off surface is generally slow, it may be promoted by the use of an air current, or heat. This expedient is most frequently used with lacquer and similar slow setting types of adhesives on relatively non-porous surfaces, thus evaporating a large amount of solvent and effecting partial preliminary setting at the time of bonding.
2. *Solution of a part of the surface itself in the adhesive.* This offers possibilities where the resultant mixture is itself an adhesive. An example is met where lacquer adhesives are used on acetate tissue where solvent action on the acetate helps to body up the adhesive. This is worth consideration in the design of coating for non-porous surfaces.
3. *Preferential removal of "solvent" from the adhesive by the stock.* This means that the surface has the ability to absorb or adsorb certain liquid or solvent ingredients either preferentially or faster than other components, thereby tending to increase the body of the surface film of adhesive. This process, commonly associated with aqueous adhesives on paper surfaces, follows two main patterns:
   a) "Seepage"—where the volatile liquid is present as a continuous phase—which is usually relatively thin bodied, while the adhesive particles are dispersed therein. Thus when spread onto absorbent paper, the liquid part drains off into the fibres and/or through the pores if these are small enough to restrain the passage of the semi-solids.
   b) Preferential migration of certain liquid ingredients—which occurs in the fibres of paper. Thus consider an individual fibre. (See Fig. 5.) Shortly after the adhesive is applied, an increase in its concentration occurs resulting in an increase in viscosity or body, and frequently in an approach to the plastic or semi-solid state.

II—Change of temperature:

1. May increase or decrease the body of the adhesive. However, most glues thin out on heating. Thermoplastics exploit this mechanism practically exclusively though it may be used in conjunction with many cold aqueous adhesives.
2. May accelerate or retard some auxiliary physical change, e.g., evaporation of a volatile "solvent" leading to bodying-up.
3. May bring about or accelerate a chemical change that does not occur at room temperature and so body-up the adhesive.

III—Chemical change may body-up adhesives by:

1. Interaction between the ingredients and the adhesive. This may be accelerated by temperature.
2. Interaction between the ingredients in the adhesive that are catalyzed by the surroundings.
3. Interaction between the adhesive and its surroundings, often caused by ingredients in the adhesive.

The compromise called "Commercial Success"

The foregoing discussion brings out clearly that the achievement of successful adhesion always involves a number of factors, prominent among which are the nature of the surface, the field requirements and the machine factors. This all vindicates the policy of the progressive consumer of obtaining team work between machine designer, fabricator of material and adhesive supplier.

Further, as it often is the duty of the adhesive to perform more or less mechanical responsibilities while still yielding clean, efficient production at the maximum rate, these factors in themselves have to be balanced against each other in the process of formulation of the adhesive—placing stress on the major demands of the situation and compromising on other details.

This concept of a "balanced formula" is really the final focus of decision to yield optimum commercial results on the equipment. Ample evidence of this is found in the large number of adhesives of each type made by responsible manufacturers—each "balanced" around a given operation.

New developments in adhesives

by D. V. Williamson

New developments in adhesives are frequently stimulated by the critical appreciation which production users of these products are acquiring. More and more manufacturers are becoming aware of the careful analysis necessary in the proper selection of adhesives. Best results are obtained only if all requirements are realized, and satisfied. Thus effort is directed toward meeting the discriminating producer's demands for satisfactory adhesives.

After all, this should not be surprising. A machine designer, for instance, feels free to make use of any metal or material that will best suit the particular function of any given part. In the matter of steel alone, the designer goes to great lengths in insisting upon analysis of strength, hardness, resistance to shock and many other properties. In other words, the designer calls for the metals and the detailed treatment of the metals which he needs so that his finished machine will be the best he can produce for the purpose. Adhesives in production packaging operations, should be selected with as much care as goes into the design of machines on which they operate.

No production packaging machine can operate to give best results unless the adhesive used is perfectly adapted to the machine and to the adhesive operation from that point on throughout the normal life of the package.

When consideration is given to the varying factors that come into play in adhesive operations—such items as different kinds of paper or board or cellophane, and such diverse matters as odor, color, speed, penetration, water-resistance, to mention some of the more obvious ones—is it any wonder that adhesives should be carefully selected?

Water-soluble adhesives—The great majority of adhesive operations on packaging machines is performed with water-soluble adhesives. This type offers several advantages, such as the ability to dilute the adhesives with water when desirable and to clean the machines with water. Water-soluble adhesives, however, can only be used under certain conditions and for certain purposes.

Water-resistant adhesives—Because of the demands of war in export shipments, there is need for great water resistance in adhesives used for sealing export shipping cases. To obtain this water resistance, raw materials must be used that are resistant to water. Such materials are usually of a type that are not soluble in water but are soluble in non-aqueous solvents, as, for example, alcohol or acetone.

Emulsion-type adhesives—The use of non-aqueous solvent adhesives on case-sealing machines gives considerable trouble, chiefly from evaporation of the solvents. To avoid this, emulsion-type adhesives are now being extensively used. These offer the advantages of water-soluble adhesives in that they may be diluted with water and machines may be cleaned with water and yet, after the water has evaporated as the adhesive sets, the resulting film is highly resistant to water.

Emulsion-type adhesives perform well in such operations, and no heat is necessary in their use. Such adhesives will very probably have usefulness after the war where water resistance is necessary as, for instance, in many packaging operations with moistureproof cellophane and metal foil.

Emulsion-type adhesives are made using many kinds of synthetic resins as bases. They have a wide range of usefulness. In many cases they offer water resistance and flexibility to compare with rubber-latex type adhesives.

Thermoplastic-adhesive method—Another type of adhesive operation that is gaining in usefulness in packaging operations is the thermoplastic type of adhesive joint. In this operation, the adhesive is applied to one surface and allowed to dry, as for example, on ordinary gummed labels. The adhesive bond, however, is not made by moistening the surface, but rather by placing the gummed surface against the surface it is to bond to and then pressing with heat—usually with an electrically heated plate.

This thermoplastic method offers several advantages. Obnoxious odors which may have been in the solvents of the original liquid adhesive are eliminated. The solvents disappear as the adhesive film dries. Also instantaneous adhesion is secured because the film takes hold immediately as it is softened and made tacky by the heat and pressure. This method is useful in some laminating processes.

Remoistening label—One additional adhesive action which is very useful, particularly in spot labeling metal surfaces, is a remoistening type of label where the adhesive film is moistened with alcohol rather than water. When this type of film (which is impervious to water) is moistened with alcohol, instant adhesion is secured to metal. No heat is necessary. The resulting joint of the label to metal (tin or steel, whether plain metal or coated) is dependable and permanent, and is unaffected by dampness or moisture.

An interesting and useful point in regard to this type of remoistening label is the fact that the label has no tendency to block or curl—and the adhesive does not rust or corrode metal in any way.

Beware of false economy

With different kinds of adhesives and different types of adhesive operations there will, of course, be some differences in costs. But, on production packaging operations, all adhesives have one thing in common: their cost is a very small part indeed of the cost of the finished package. The adhesive cost, in nearly every case, is so small that the production manufacturer can only afford to consider the use of adhesive products which do their work thoroughly and with a minimum of operating trouble and expense. Any other type of adhesive would be too expensive to use even if it cost nothing per pound.

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Resin adhesives

by Dr. Alexander Frieden

Resin adhesives are adhesive compositions made with synthetic resin bases. Besides these bases they contain certain modifying substances, such as plasticizers, penetrants, wetting agents, etc. Such adhesives are used for special adhesive purposes where ordinary adhesives are ineffective. The user of adhesives should make quite certain whether or not his requirements are such that only resin adhesives can fulfill them, because the resin adhesives are as a rule considerably more expensive than starch or protein glues.

Broadly speaking, the use of resin adhesives is indicated under the following conditions:

1. Where the surfaces to be adhered are not wetted by or are incompatible with starch or protein adhesives.
2. Where the glue line must exhibit properties unobtainable with ordinary glues. Among such properties are water resistance, flameproofness, high mechanical strength, flexibility, etc.
3. Where special conditions of the gluing operation cannot be met with the ordinary type of adhesives. Illustrations of such conditions are where the operation is such that no evaporation of water or solvent can take place quickly, or where extremely quick tack is necessary, or where chemicals—such as borax or ammonia—cannot be used with the particular equipment.

The number of synthetic resins is extremely large, but they all fall into a dozen or so groupings, classified according to their chemical makeup. The principal classes of interest for adhesives, their chief characteristics, and some of their trade names are as follows:

Phenolic type—Resins of this type are synthesized mainly from phenol and formaldehyde. To a lesser extent they are manufactured from phenol and furfural, and from formaldehyde and the higher phenols. Among the best known in this group are those recognized in the trade as Bakelite, Resinox, and Durez.

This type of resin is thermosetting, and is characterized by high mechanical strength and resistance to moisture, fungi, and flame.

Urea and melamine types—These are synthesized from urea and formaldehyde, or from melamine and formaldehyde. A few of the well known trade names in this class are Melmac—for the melamine formaldehyde type; Urac, Uformite, Plaskon—for the urea formaldehyde type.

This type of resin is thermosetting, has fair water resistance, and polymerizes at temperatures which are comparatively low.

Hydrocarbon type—This type of resin includes principally cumars and styrenes. They are known in the trade as Cumars, Nevilles, and Nypenes.

They are thermoplastic, resistant to moisture and to fungi, but the cumars are rather brittle.

Cellulose type—Mainly ethyl or methyl cellulose, cellulose nitrates, and cellulose acetates comprise this type, and among these, Ethocels, Methocels, and Pyralins are well known in the trade.

They are thermoplastic. Their important properties are resistance to moisture, flexibility, and durability.

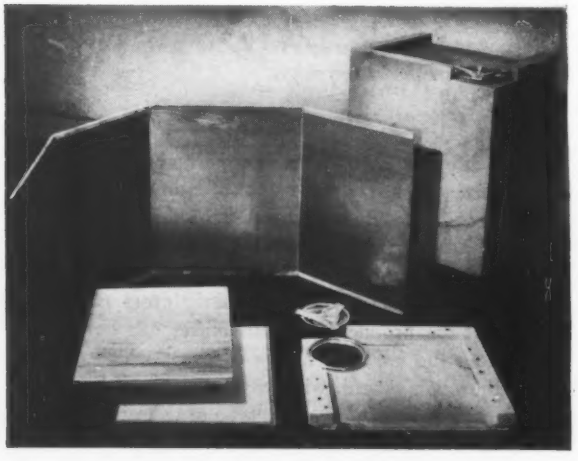
Vinyl type—Chief among these are polyvinyl alcohol, polyvinyl acetate, polyvinyl chloride, and vinyl copolymers. They are known in the trade as PVA, PVAc and Vinylite, respectively.

They are thermoplastic. The acetates, chlorides, and copolymers are water resistant. They form strong bonds and have some elasticity.

Alkyd type—The best known among the alkyd resins are the Glyptals. They are thermoplastic, water resistant, and particularly outstanding for their properties of flexibility and elasticity.

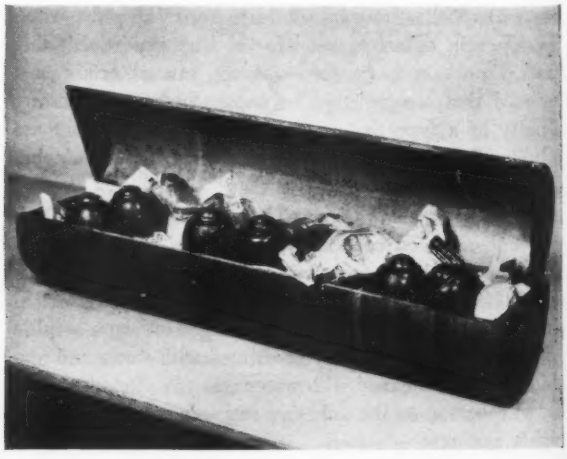
1—*Army's powder box of plywood, metal lined, is light, small and safe.*

1



2—*A hinged candy box of plywood which suggests re-use possibilities.*

2



Acrylic type—These are made from methyl and ethyl methacrylates. The best known in the trade are Acryloid, Acrysol, Lucite and Plexigum. These resins are thermoplastic, water resistant, elastic and clear.

Rubber-like type—This type falls into two classes: chlorinated rubber and synthetic rubber. The most commonly known chlorinated rubber is chloroprene. Among the synthetic rubber resins well known in the trade are Hycar, buna, and Neoprene.

These materials, when used as bases for adhesives, produce water-resistant products that do not crystallize.

Synthetic resins, when used as adhesives, are manufactured principally in four different forms, as follows:

1. Pure resin—liquid or powder
2. Resin solutions
   a) In organic solvents
   b) In water
3. Emulsions
4. Dispersions

Not all of the resin types enumerated above can be made in all four forms, but, generally speaking, each may be made up into more than one modification. The dry resins, in powder form, find their greatest application as adhesives for plywood. Among these, the phenol formaldehydes and urea formaldehydes are employed where bonds can be formed using heat and pressure.

The liquid resins, such as phenol formaldehyde liquids or vinyl acetates, are used wherever conditions are favorable for further polymerization of the resin during the processing. Generally catalysts and heat are required.

Organic solutions of resins are widely used where the surfaces to be adhered require an organic solvent to cut into the surface, or where the adhesive is compounded with other materials such as plasticizers and modifiers soluble only in organic solvents. The most generally used adhesives of this type are the cellulose type, the alkyds, and the acrylates.

Water solutions of urea formaldehyde resins and melamine formaldehyde resins are widely used, particularly with starch adhesives, to impart water resistance to the latter. Polyvinyl alcohol is also water soluble and can be used as an adhesive not requiring water resistance.

The use of emulsions is generally preferable to solutions, particularly where the emulsions are of the oil-in-water type. This enables the emulsion to be diluted with water whenever necessary, and eliminates the fire hazards usually associated with organic solvents. Generally, the emulsions have quick tack. The emulsion is so adjusted that it breaks on application, so that the glue line is water resistant. Outstanding among the emulsions are the polyvinyl acetates.

It has not been possible to prepare many of the synthetic resins in the dispersion form. However, when this was accomplished the results have been quite outstanding. Chief among the adhesive dispersions are the synthetic rubber latices, and the vinyl copolymers.

The above is a very brief outline of the applications of synthetic resins in the adhesive field. Each problem has to be analyzed, depending on the particular requirements for the adhesive, and the proper product selected accordingly. No general rule as to type of synthetic resin adhesive can be given that would be consistently applicable in a broad sense.

4



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3



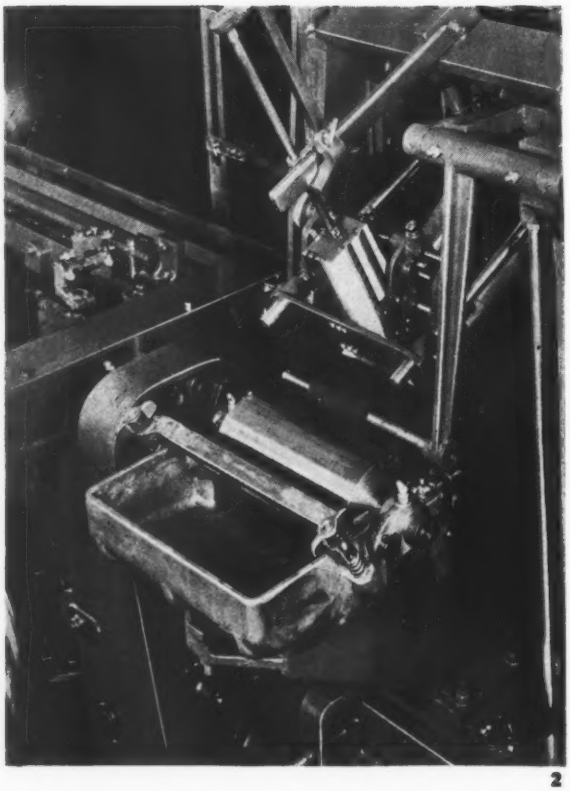
3—Resin-adhesive tape being applied to split plywood veneer. 4—New resinous adhesive can be used for bonding metal-to-metal as well as wood-to-metal or wood-to-wood. Photo, Goodyear Tire and Rubber Co. 5—Convolutely-wound container (small model) for holding high test gas.

Equipment for applying adhesives

by D. V. Williamson



1



2

1—This illustration features the glue applicator on a machine which forms, fills and seals bags which are used for packaging dry products. Photo, Consolidated Packaging Machinery Corp. 2—Adhesive-mechanism assembly with which this bottle-labeling machine is equipped is shown in the foreground of illustration. Photo, Economic Machinery Co.

Probably no two experts at golf have exactly the same form. Each player has his own individual stance and swing, and no two are identical. However, all good golfers have one thing in common: whatever their form and however they swing their clubs, the club head must do what it should do—at the point of contact with the ball.

This fundamental principle applies to any skill. With adhesive operations in industry, there are many methods for applying the adhesives, and they differ widely in form. However, whatever methods are used, they all have one essential requirement. For successful results in applying adhesives, application of the adhesive, in liquid form, must be made at the proper time and place.

Let us consider for a moment this somewhat elusive word "adhesion." It is true that in many operations the adhesive performs its functions so silently and reliably that its work is taken for granted—in the same way we take for granted the air we breathe.

Which adhesive? Which method?

As new and ever-changing packaging materials come into use, and as production speeds constantly climb up and up, situations arise where, to obtain best possible overall packaging performance, the type of adhesive to use and the method of application must be given full consideration.

Indeed, the type of adhesive and the method of applying it must go hand in hand. In the building of new packaging equipment, the machine designer would be well advised to learn fully about adhesive possibilities as the design goes along.

It is possible that sometimes the conventional roller-application method may be best, while in other circumstances application by spraying or thermoplastic adhesion may be far more efficient.

A discussion of some of the methods for applying adhesives by the use of packaging equipment is given in following paragraphs.

Brushing

The hand brush is a method of applying liquid adhesives which is so well known that it needs little comment. It is useful where packages are not of uniform shape and where production is limited.

The tendency in brush application is towards films which are too thick. Thin films are better. With this method, boxes or cartons are frequently piled one on top of another for pressure. There are available, however, suitable pressure units.

The direct roller

On production machines, the brush method gives way to other devices which are more versatile and efficient under continuous operation.

In direct-roller application, the roller revolves partially submerged in the adhesive reservoir, and the adhesive is applied by the non-submerged portion of the roller directly to the surface to be glued. The thickness of film may be controlled by adjustment of the aperture between the roller and the adhesive reservoir, or it may be controlled with a doctor blade.

In general, cold liquid adhesives are usually used, but this method also allows the use of hot adhesives by heating the glue pot. Examples of this application are with the use of machines such as case-sealing, tube-winding and folding-box machines.

The transfer roller

Here the adhesive is transferred from the partially submerged roller to another roller which in turn applies it to the surface to be glued. Sometimes the transfer traverses back and forth with a reciprocating motion, as is the case in some of the carton-sealing and bottle-labeling packaging operations.

An adhesive, to perform properly under this method, must not string or cobweb under the reciprocating action, and it must not thicken up too much from the rapid evaporative action of the transfer roller.

Stencil application

Adhesive is applied by a roller to stencils cut to the size and shape of the spots of adhesive to be applied. The stencils are on reciprocating arms which move back and forth for fresh adhesive film which they deposit at the proper place.

Examples of this are some types of bottle-labeling equipment and Brightwood box-forming machines. Adhesives, to be satisfactory here, must have heavy body, be readily transferable without cobwebbing, and must have great initial tack.

Belt transfer

In this method, the adhesive is transferred from an open glue pot by means of a rapidly moving endless belt which passes through the adhesive and then over and across the surface of the label. The most familiar example is the lap-label joint employed when using the cylindrical-can labeler.

For satisfactory results, the adhesive must flow readily while in heavy paste form, must cut off short, and must maintain constant viscosity under the continuous agitation necessary for such operations.

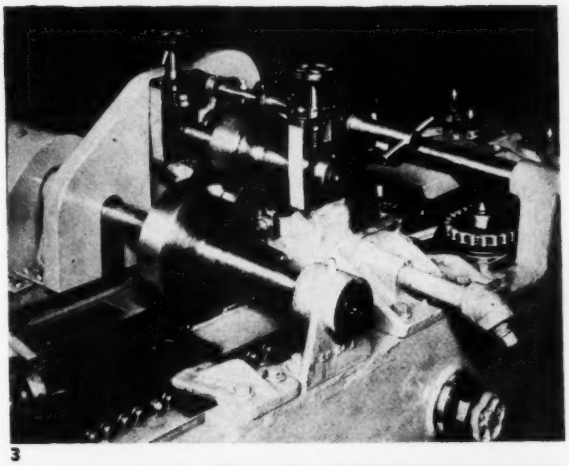
Hot melt

With this type of application, the adhesive is only fluid when heated. Because of this, it sets up a thin film instantly upon touching a cold surface, and in this way rapid operation is permitted.

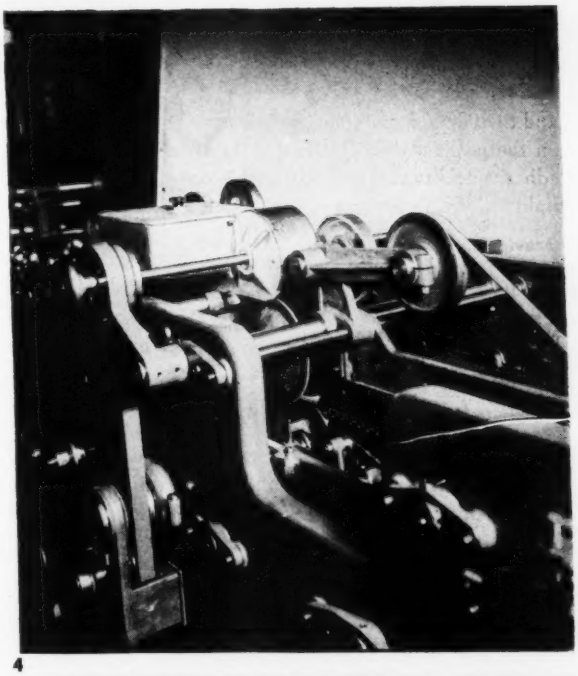
The familiar example is the hot pick-up gum for cylindrical-can labeling.

Dipping

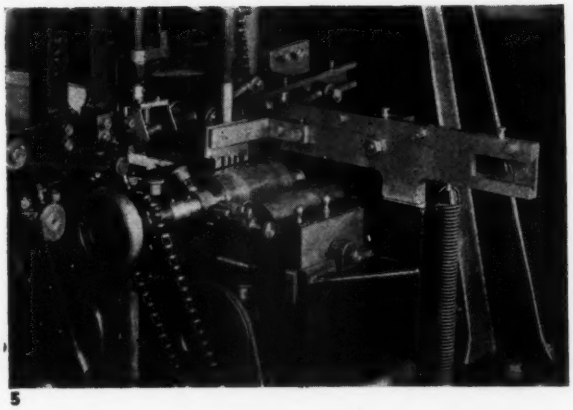
Some machines are designed to have a plunger dip under the surface of an open reservoir of liquid adhesive



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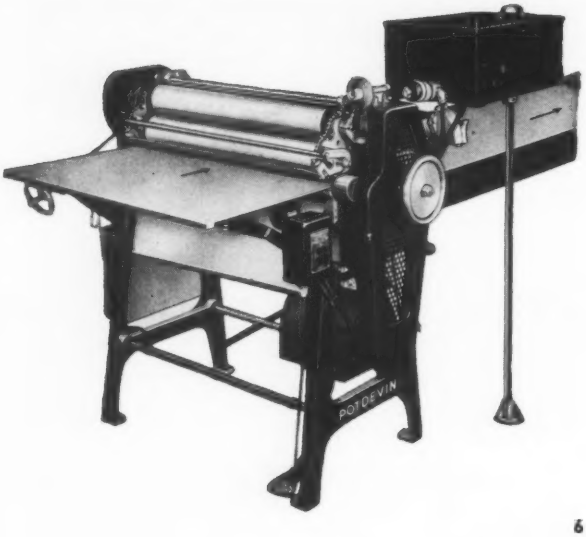


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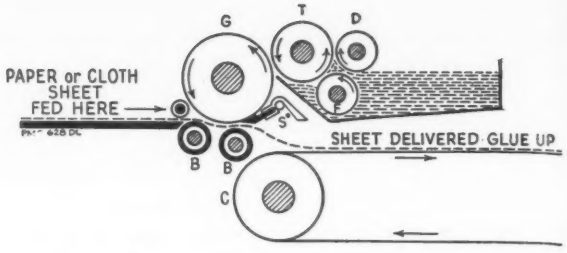


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3—Gluing mechanism on a machine which is used for automatic sealing of envelopes. Photo, Stokes & Smith Co. 4—Glue applicator of folding box machine. Photo, International Paper Box Machine Co. 5—Labeler on a cigarette packaging machine. Photo, Arenco Machine Co.



6



7

6—Flat sheets are fed into conveyor glue at 40 per minute, emerging onto conveyor. 7—Dotted line in schematic drawing shows course of paper and cloth sheets through machine. Photos, Potdevin Machine Co.

and then deposit a dab of the adhesive at the proper place on the package. This method calls for a very thin liquid adhesive which cuts off short and is only suitable for very light adhesive operations.

Gravity or pump feed

When packaging machinery is designed to feed the glue reservoirs with fresh adhesive by gravity or pump pipeline feed, it is, of course, essential that the adhesive be of such viscosity that it will flow suitably.

Capillary action

On some delicate operations, the thin liquid adhesive is brought up to the point of contact by capillary or wick action. An example of this is the application of solvent for the sealing of moistureproof cellophane in the packaging of cigarettes.

This method is only suitable in using liquid adhesives free of solid matter; otherwise, the pores in the wicks would clog up and fail to deliver.

Remoistening

Remoistening is used with pregummed surfaces, as on bags, envelopes, gummed sealing tape and some types of bottle labeling. The gummed surfaces are moistened with water just prior to application. Gummed surfaces moistened with water do not, however, hold well to tin or metal.

However, in this connection, it is interesting to note that a new type of remoistening gum which is moistened with alcohol instead of water does hold spot labels to tin or to metal with a bond which is both strong and permanent for all practical purposes.

Thermoplastic adhesion

With this method, the surface has also been pregummed in the same fashion as with ordinary gummed labels, but a different type of adhesive is used. Adhesion is secured by pressing down electrically heated plates at the point of contact. The heat instantly makes the thermoplastic adhesive liquid, and because of this it is possible to secure instant adhesion.

This method is useful for some types of bag and envelope closing, for laminating, and for certain types of labeling. One distinct advantage is that the solvents in the original adhesive are not present in the dried film used. These solvents are frequently inflammable and of objectionable odor.

Spraying

This method is sometimes used to apply adhesives in locations and under conditions where no other method will operate. Spraying is successfully used, for instance, to apply highly volatile and fast-acting adhesives in the sealing of filled bags of foodstuffs under conditions where no other method of application would serve to accomplish the desired result.

Chemical attraction

In addition to the different methods of applying adhesives on packaging machinery, some other factors involved in the operations should be mentioned.

In any adhesive operation, the adhesive should be chemically attracted to both surfaces it must join together. If this does not occur, failure may result. This is an item of increasing importance as new finishes on paper, new plastics and new metal surfaces keep appearing in the packaging field.

This point is readily illustrated by the fact that adhesives which may be entirely suitable for securing labels to glass may fail in joining spot labels to tin cans. The reason for this difference is that in the former case the adhesive is chemically attracted by the glass, while in the latter case it is repelled by the tin.

Factors governing adhesion

Given the proper adhesive and the correct method to do the job at hand, the three variable factors to be considered are pressure, time and heat.

Pressure—Generally speaking, the greater the pressure the faster and better the adhesion. The pressure forces the adhesive into the pores and fibres of the label or paper or board. Of course, pressure must be kept in line—it cannot be so great as to crush a package. That brings up our next item, which is:

Time—If great pressure is not possible, then the package must be kept under pressure a sufficient length of time for satisfactory adhesion.

Let it be remembered that length of time under pressure does not slow down production at all. It simply means longer pressure units. Let it also be pointed out that the great majority of liquid adhesives used in packaging set up or take hold from evaporation of water content. On dry winter days this action is much faster than in humid summer weather.

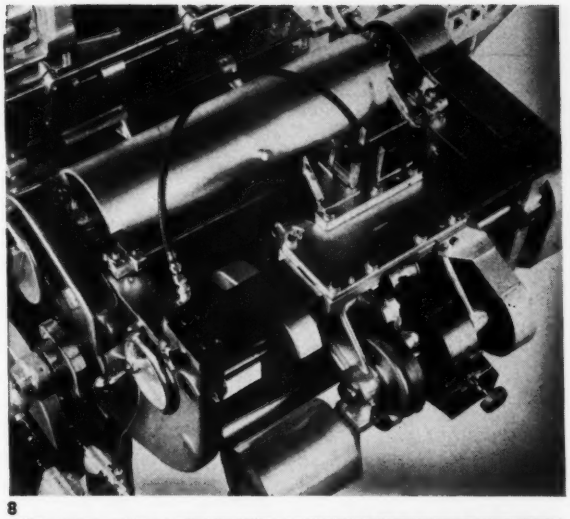
Design the pressure unit for the worst condition—it is good insurance, and a precaution which will yield much customer good will.

Heat—Most packaging-sealing operations are performed with cold liquid adhesives. This is the ideal type. However, in stubborn cases, or where time under pressure is very important, one or two steps may be taken to facilitate the operation by using heat. If the adhesive is suitable, heat the glue reservoir. This will frequently give faster penetration and, consequently, it will result in faster adhesive action.

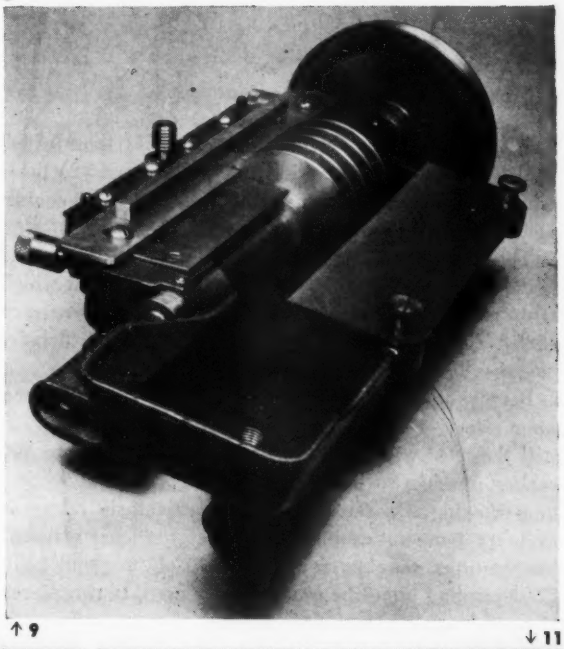
Apply electrically heated plates to the glued joint after the adhesive is in place. This method may be used with solvent type adhesives which could not be heated at all in the glue reservoir. It is frequently used in sealing and labeling moistureproof cellophane.

Packaging machinery and adhesives are constantly being called upon to produce with new and varied materials, and in addition to this there is always present the modern watchword—speed.

A proper consideration of adhesives will help tremendously. Give your adhesive a chance.



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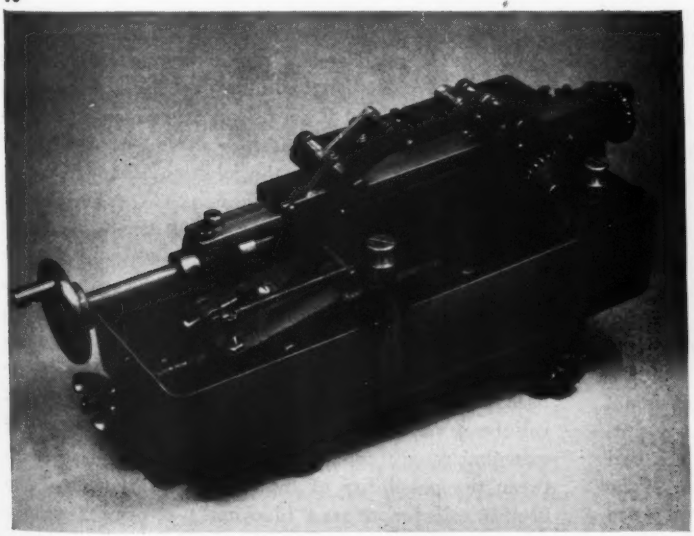


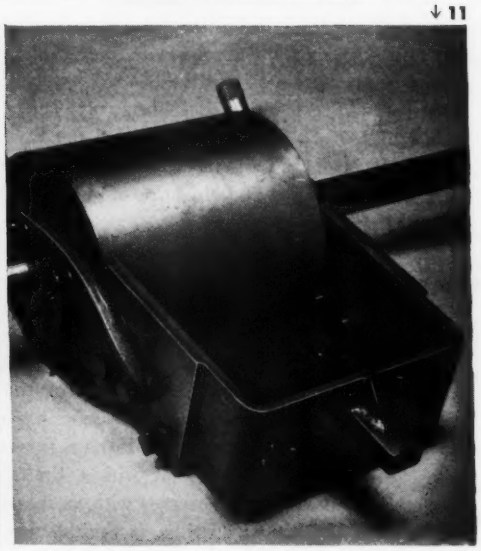
↑ 9

↓ 11

8—Glue receptacle, transfer roll and label magazine on cake-wrapping machine. Photo, Battle Creek Bread Wrapping Machine Co. 9—Roll-type gum pot for labeling machine provided with electrical heating element and thermostatic control. It handles hot or cold adhesive. Cans rolled over discs pick up spots of gum which, in turn, pick up the label. 10—Adjustable chain-type gum pot. Chain picks up proper quantity of adhesive for application to container. 11—Glue pot for carton sealer applies cold adhesive. Photos 9, 10, 11, Standard-Knapp Corp.

10





Heat-sealing principles

by F. S. Leinbach

For the purposes of this discussion, heat-sealing agents are thermoplastic materials which can be formed into films or can be coated upon papers or other films and are reasonably normal, non-sticky solids at ordinary temperatures, but which either melt or become very sticky at temperatures ranging from about 150° F. to about 300° F. If two pieces of such an agent are pressed against one another and if the area of their contact ("interface") is raised to the temperature at which the material either melts or gets very sticky, the two pieces will weld together (i.e., be "sealed" by heat). If the same agent is coated over the surface of, for instance, paper, in sufficient thickness, two layers of that coated paper, if pressed together and heated, will be "sealed" by action of the heat-sealing agent comprising the coating.

Types of agents

Heat-sealing agents are of two types: (1) those which are coated upon some carrier film or sheet and (2) those which can be made into films by themselves. Of course, some materials can operate in both categories.

The heat-sealing agents which are coated upon carrier films or sheets, in turn, are of two types: (a) those which truly melt and (b) those which, on heating, become very sticky. This latter type generally is of materials which decompose before they get hot enough to melt.

Paraffin wax is typical of the agents which are coated upon a film or sheet and which truly melt. Waxed paper, still the most widely used heat-sealing material, was the earliest product to bring the advantages of heat sealing to packaging. Paraffin wax is not particularly sticky at ordinary temperatures, but melts at somewhat elevated temperatures, ranging from about 130° F. to about 140° F., depending upon the grade of wax used. If two pieces of waxed paper are pressed together and are sufficiently heated through to their interface, the paraffin on their surfaces will melt and fuse. While molten, the wax is not sticky, hence will not hold the two sheets together, but if they are held in position until the fused wax in the interface chills, the wax will have sealed the two sheets together. It is characteristic of most true melting agents that their seals must be held in position while the sealing material solidifies.

The force required to separate the two pieces of sealed waxed paper, that is, the tightness of the seal, is easily seen to depend upon the cohesion of the wax with itself and the adhesion of the wax to the paper. It is common experience that neither the cohesion of paraffin nor its adhesion to paper is very great; therefore, the tightness of the seal, or the seal strength of waxed papers, is not very great, although obviously adequate for many purposes. It should be noted that within limits, the seal strength of waxed paper increases with an increase of the thickness of the waxed coating. It should also be noted that until a certain thickness of wax is coated on the surface of paper, it does not become heat sealing. If, under the heat of the seal, too much of the wax is absorbed into the paper or among its surface irregularities, too little remains on the surface to effect a seal.

In order to improve the seal strength of waxed papers, it is necessary to cause both the cohesion of the wax and its adhesion to its base sheet to be strengthened. This is done by adding materials like rubber, rubber derivatives or related compounds or resins. Suitable materials of these types not only raise the melting point of the wax, but also make it become quite sticky when hot. In fact, blends of this type do not have a true melting *point*, but, as the temperature increases, they become sticky ("tacky") and softer until they finally do approach what might be termed a molten state, though never so fluid as molten wax. The relation between temperature increase and progressive softness is known as the "melting" or "softening" range of the blend. As indicated, such blends can be made to be quite tacky when hot and thus make quick and firm heat seals with a minimum of chilling required before the seal "sets." In some cases, at sealing temperatures, the material of the coating is so tacky that no chill is required, for the tackiness of the material, though hot, is sufficient to hold the seal together. Blends of this type usually have excellent adhesion to many things and papers or films coated with fairly heavy coatings have found widespread application, such as in bags for wet pack frozen foods, in cheese wrappers, and in "heat-seal" labels, where the tackiness of the hot material coated on the back of the label is useful in adhering the label to almost anything including glass, the sealed ends of waxed bread wrapper, individual frankfurters, etc. As may have been noted, such modification of wax tends to direct it into the second type of agents that are coated upon a carrier sheet or film, namely, those which on heating do not melt, but become very sticky.

Most widespread among these latter agents are nitrocellulose lacquers. Nitrocellulose, by itself, is anything but heat sealing, but it does form cohesive coatings. Adhesion between the nitrocellulose and the carrier film or sheet is obtained through the addition of resins, which have, as a class, excellent adhesion. This blend is then softened with a "plasticizer" to a point where the softening range is such that the coating is not sticky at ordinary temperatures, but becomes so tacky at elevated temperatures that fusion may be had. Here, as with the paraffin or modified paraffin, the seal strength remains a function both of the cohesion of the coating and its adhesion to the base material. It is difficult to find that rare blend of nitrocellulose, resin and plasticizer which has the proper softening range; and the lacquer formulator is ever between the possibility of the coated material sealing to itself in rolls before use ("blocking"), or of not becoming

sufficiently tacky at permissible temperatures to seal effectively. For these and other reasons, *all* heat-sealing packaging materials should be stored at moderate temperatures by the user, avoiding excessively warm storage.

The outstanding, widespread example of nitrocellulose heat-sealing coating is to be found in heat-sealing cellophane. As is commonly known, this product is made by applying a nicely blended nitrocellulosic heat-sealing coating to a film of regenerated cellulose. This coating has other functional advantages besides heat sealing.

There are a number of other agents which adapt themselves to heat-sealing coatings. Ethyl cellulose and its blends make coatings that heat seal excellently. Cyclized rubber coatings have a quick, firm heat seal. Cellulose acetate can be formulated for heat sealing. The vinyl polymers produce coatings that heat seal at fairly low temperatures. Vinylidene chloride polymer, also the mixed cellulose ethers and polyvinyl butyral, all produce excellent seals, but their fullest use is not nearly developed as yet because of production limitations imposed by war conditions. These agents vary in their cohesion and in their adhesion to base materials; therefore, the strength of the seals they make will vary.

Many heat-sealing agents are cohesive and strong enough to be cast into films, and thus do not need to be coated upon some carrier sheet or film, although some may also be used as coatings. An example of heat-sealing film material is well known in rubber-hydrochloride film, widely used before the necessary curtailment of rubber. Ethyl-cellulose film also was well known, though newer and with less widely extended uses. Cellulose acetate has been cast into films for packaging purposes for some time and has found extended use, particularly where greaseproofness is required.

Methods of application

Heat-sealing agents are directed to packaging use in four general methods: (1) as a self-supporting film (2) as an overall coating on a carrier sheet or film (3) applied as a spot or strip only to those areas of a sheet or film that are the areas to be heat sealed in forming or closing the package (as around the mouth of a bag) and (4) applied to the areas to be heat sealed, just as the package is in the process of formation.

In the case of the self-supporting film, the strength of the properly made seal is the strength of the material itself. A package made from a heat-seal film and having completely heat-sealed closure is literally encased in a continuous unbroken film of that material. The advantages of such an arrangement in terms of moisture-vaporproofness or the other functional qualities of the film are altogether obvious.

In the case of the overall coating, the same situation may be closely approached, even approximated with ideal seals, although the full functional efficiency of packages made from coated sheets or films is more likely to be impaired by less than perfect seals.

In both cases, however, considerable advantage in package formation accrues from the fact that any two areas of the films or coated papers, when placed in contact and heated, will form a seal. No regard need be paid to having exactly the right spot in the right position. These methods of directing heat-sealing agents into packaging work are the most widespread and enable the formation of wraps, bags, packages and package adjuncts of varied types and description.



1

1—Frozen food packages must seal flavor in and resist moisture penetration from without. Blending of the waxes with thermoplastic resins used to coat wrapping materials increases strength of the package seal.

Heat-sealing agents directed to packaging use through applying a spot or strip only to those areas to be heat sealed are finding increasing use, particularly in bag manufacture. Many materials that have most useful qualities, such as the greaseproofness of parchment, and the moisture-vaporproofness and greaseproofness of laminated glassine, do not happen to have the ability to heat seal. They can be augmented with a coating to lend heat-sealing characteristics, but if the coating does not have to contribute some other useful function, it is not an economical measure since the majority of the area covered by the coating is not involved in performing the heat-sealing function. In bag manufacture this problem is solved by applying an imprint of heat-sealing agent around the inside edge of the top of the bag, because this is the only area that needs to be in contact for heat-seal closure. In some applications of foils, a thermoplastic material (i.e., heat-sealing agent) is "spotted" in strips along only those areas of the web which will be in contact when the seal is made.

The direction of the heat-sealing agents into packaging use by applying them to the areas to be sealed, but applying them as the package is in the process of formation, is peculiar to certain types of wrapping equipment which enables the advantages of heat sealing to be used on non-heat-sealing webs, just as in the previous method. In this case, however, the web is fed into the wrapping machine and as it is placed around the object to be wrapped, just before the areas to be sealed are brought into final con-

tact, strips of heat-sealing agent (thermoplastic material) are placed on the proper areas, the closure is made and the seal ensured by heating.

Heat-sealing materials

Even for elementary inspection and evaluation of any heat-sealing packaging material, it is necessary to know the temperature required to effect the seal with that particular heat-sealing agent (which does not mean the temperature of sealers on machines that will handle the material, a factor which is discussed on p. 664), the strength of the seal and whether or not the material is likely to block (stick together) during shipment prior to its use.

The fusing temperature of any heat-sealing agent varies with the formulation of the material itself and must be determined for each agent and for any variation of it. A method for such determination has been to press two thicknesses of the material together between two heated metallic sealer surfaces with sufficient pressure to ensure close and uniformly even contact, inspecting the tightness of the seal at progressively increased temperatures. For almost all materials an optimum temperature range will be found, below which or above which the seal is not as firm as it is if made at temperatures within the optimum established range.

The material of the sealer surfaces should be non-reactive to materials such as resins having high acid numbers and should have good thermal conductivity. Copper suggests itself from both standpoints. The source of heat probably would best be electrical and should be of such shape and position as to ensure even heat distribution across the sealer surface. The temperature might be measured by a surface pyrometer actually placed against the sealer surfaces, but maintained by close thermostatic control, in which case the thermostat bulb should be between the source of heat supply and the sealer surface. It may be possible to do this job through accurately calibrated thermostatic control alone. The sealing surfaces probably should be flat, since the same apparatus is essential to the ensuing test, and serrations might cause an uncontrollable variable in that test. The trouble with this, however, is that metal parts, however carefully manufactured, tend to warp even slightly under prolonged heating, and even slight variation of pressure alters the effectiveness of the seal. It is probable, therefore, that one of the sealer surfaces should be a heat-resistant resilient material, possibly one of the vulcanized synthetic rubber compounds. This suggests one sealer surface or block made of metal and containing the heat source, the other made of a resilient material, without a heat source. The force applied to make the seal should be sufficient to ensure close contact throughout the sealed area. The time of contact should be long enough so that the entire sample is raised to the indicated temperatures, regardless of thickness or conductivity.

It must be remembered that in the case of coated materials there are many combinations where the seal is stronger than the base material, resulting in a "tear" seal, meaning that on separation of the seal the base material tears without causing the seal to fail. Thus, a strong sealing coating on a weak base material can give a tear seal, but on a stronger base material it may not cause a tear seal.

It is the opinion of the writer, though this is not necessarily shared by various well-informed workers, that in any standardized seal strength test some means of correlating such performances must be worked out. It has been suggested, and it may be shown to be adequate, that in the case of the tear seal one should report the force that had to be exerted, with a notation that the seal was stronger than the base material.

Techniques

The effectiveness with which two or more layers of a particular heat-sealing material may be made to seal together depends upon three factors: (1) temperature applied (2) the pressure with which the layers are held in contact and (3) the time during which the hot contact is maintained. Each of these factors varies in reaction to the other two.

The temperature factor

A heat-sealable agent is heat sealing because there is some temperature at which it either melts or becomes fusible. The factor of temperature in heat sealing, there-



2

2—These two Junket cartons are both heat sealed. (Left) Paper-wrapped carton has the heat-sealing agent applied at the proper areas at the time of wrapping. (Right) This foil-covered carton is an example of the method of applying the heat-sealing resins during the process of formation of the package.

fore, is determined by the temperature at which fusion of the particular material can be accomplished, but it should be noted that if an agent fuses at 200° F. the sealing mechanism furnishing the heat may have to be much hotter than that, for it must drive enough heat through the intervening layers of sheet or film to raise the two surfaces in contact to the fusing temperature. How much hotter the sealing mechanism must be depends entirely upon the pressure with which the contact is maintained and particularly upon the time that is allowed for the heat to transfer. Furthermore, surface temperature of the sealing mechanism is only an indicator—the amount of heat its heater can furnish is the real determining element, because it must have sufficient capacity (wattage, in the case of electric heaters) to transfer heat enough to make seal after seal and still maintain the temperature differential required to cause the heat transfer capable of raising the inner surfaces to their fusing temperature. For the surface of a sealer to be quite hot at the start of a run is of no particular value. The heater must be strong enough to keep it up to the proper temperature throughout the run.

The pressure factor

Pressure of contact is important because under close contact the heat will transfer more uniformly, more thoroughly, more quickly, because the seal will be stronger with every point of the sealing area in close contact rather than apart in spots and because the temperature at which most heat-sealable materials will fuse generally decreases, within limits, with an increase of pressure. As is well known, some of the softer heat-sealing agents will seal at ordinary temperatures under sufficient pressure. Increased pressure, therefore, aids the ease, strength and thoroughness of a seal unless some extraneous factor, such as rupture of the carrier film, for example, is unexpectedly introduced.

The time factor

Time is a very important factor in heat-sealing technique and, as indicated above, is closely related to temperature. At any given temperature and pressure, enough time must elapse for sufficient heat to penetrate the intervening layers and cause fusion of the sealing surfaces. Increased temperature (properly caused by sufficient heat supply) and increased pressure will require less time. Thus, of the three basic factors in heat-sealing techniques—temperature, pressure and time—none of these factors operates independently for each is closely related to the other. Regarding this temperature-pressure-time relationship, it is also important to note that there are limits affecting each of the three factors and their interrelationship. If the heat supply is increased, at a given pressure, the time can be decreased, but this relationship reaches a limit two ways. The first limit occurs when the time is so short that the sealing mechanism must become so hot that it burns the outer plies of the seal, without raising the inner sealing surfaces to the sealing temperature. This is one reason why certain materials are found to have a limit of operating speed regardless of heat supply in the sealing mechanism, for as the speed of sealing of the mechanism is increased, the time factor is decreased to a point at which the above-mentioned difficulty is encountered. This is fairly common and is most easily noted on fibrous base materials. This situation can be alleviated if the sealing or wrapping mechanism is equipped to apply to the sealing areas small amounts of a solvent which will partially dissolve or soften the heat-sealing agent. Under that heat which does reach the fusing surfaces, this solvent softens the coatings, enables them to fuse and then evaporates under whatever heat is there at the time or during subsequent time. Such aids to sealing are known as "solvent activators" and their composition must vary according to the composition of the heat-sealing materials they activate, for they must be of a type capable of dissolving that particular coating. They are so effective that the widest use is in enabling heat seal of materials that ordinarily are not heat sealing, such as the type of cellophane usually used for cigarette pack wrapping.



3

3—Vitamin pellets, hygroscopic and sensitive to thermal changes, are put in heat-sealed packet within folding carton. Inner envelope has small opening at one end so consumer can dispense one pellet at a time.

The second limit on the time portion of the temperature-pressure-time relationship is, as indicated above, the strength of the heat supply. It is most important to realize that the surface temperature of sealers at the start of a run means little. There must be sufficient heat supply to keep furnishing heat to seal after seal without cooling below the supposed or apparent surface temperature. One fallacy of inexperienced operators is to suppose that because a thermostat on the sealers of a high-speed machine has a marking for 500° F., the mere setting of the device at that figure guarantees that temperature. Under some such instances it has been found that the current merely is allowed to flow all the time, that the heater is not strong enough during the run to hold the temperature above an actual 275°—325° F. and that, as a result, the thermostat never gets a chance to control the temperature. Obviously, for effective operation under this condition the time factor must be adjusted (machine slowed down) until it balances the heat-furnishing ability of the sealing mechanism at hand. *(Continued on next page)*



4

4—*A heat-sealing banding material, sealed between the frankfurters, makes possible this Kartridge Pak, developed by Oscar Mayer & Co.*

Temperature range for heat sealing

Every heat-sealing agent has an optimum sealing range of temperature below which inadequate seals are obtained and above which the seal is not so tight as it could be made. This sets a limit upon the temperature portion of the temperature-pressure-time relationship. The effect of a solvent activator, used under difficult circumstances, is to broaden the optimum sealing temperature range of the heat-sealing agent. A further limit becomes apparent when it is realized that if the outer plies, or outer portions of plies adjacent to sealing surfaces, are made so hot that they remain above the sealing or fusing temperature of the heat-sealing agent, that agent remains soft, the seal is not self-supporting and it comes open. Some materials that actually melt, such as paraffin wax, and others which fuse at similarly low temperatures, always require definite "chill," or cooling while the component plies of the seal are held in place. An example of this is found in the "take-away" belts on a bread wrapping machine handling waxed paper. Without the chance to solidify in position, the seals would all come open. Materials that fuse at a higher temperature, such as heat-sealing cellophane, do not need that type of "chill," but they must not be made so hot that their heat cannot quickly transfer to surrounding areas or the seal will be less effective. Self-supporting, heat-sealing films, such as rubber hydrochloride, should not be made too hot, for the material will be pressed out too thin and what otherwise would be a weld of the entire material as strong as the film becomes the weak point.

The limitations on the pressure portion of the temperature-pressure-time relationship are mainly mechanical.

The handling of the temperature-pressure-time relationship is a technique which must be worked out in practice with a given heat-sealing material on a given sealing machine and given job. Big packages, run at high speed, take more heat away from the sealers and require more heat than smaller ones run at lower speed.

For each seal, regardless of how rapid the successive rate of making the seals, enough heat must be transferred from the sealing mechanism through the packaging material to the inner sealing surfaces to raise the sealing agent to its fusing temperature. Temperatures that are initially high are meaningless. The heat supply must be sufficient to maintain the higher sealing temperature that will ensure this flow of heat through to the inner sealing surfaces of each successive package as the seals are made throughout the run. The temperature-pressure-time relationship is not hard to establish, however, particularly if the supplier, who understands his material, and the user, who understands the job can cooperate.

Mechanical principles involved

The mechanics of causing heat seal generally are effected through contact between the material to be sealed and a close-pressing, heated area of metal. Translated into moving machinery, this is accomplished through three types of movement—reciprocal, rotary or sliding.

The simplest form is reciprocal motion and it is exemplified in the common crimp sealer, wherein two heated metal plates are brought together, pressing the areas to be sealed between them. The simplest are manually operated, with time and pressure, and sometimes temperature, left to the experienced judgment of the operator. These are improved with thermostatic heat control and in some machines complete control is given for the whole temperature-pressure-time relationship by thermostatic control of temperature and by actuating the sealing jaws with an electric motor through a drive having adjustments to control pressure and time. Various types of configuration of the sealer surfaces are used by the different manufacturers. Some form of surface configuration usually is desirable, enables a tighter seal and minimizes the slight mechanical difference so sure to occur through the warping of any metal part that is continually kept hot. Surface configuration thus minimizes occurrence of areas of too light pressure between partial areas of the sealer surfaces.

Reciprocal sealing motion is being used increasingly in wrapper and package forming equipment. Certain machines placing liners in cartons make ingenious use of reciprocally moving sealers that travel with the liner forming device. Reciprocal motion also is used in various types of machines making bags which have all seams and seals heat sealed and is not only advantageous, but is one of the two forms of sealing motion to which certain heat-sealing agents are limited.

Rotary motion, as the term applies, effects a heat seal by having the layers to be sealed pass beneath a heated roller or between two heated rollers. Here the time factor of the temperature-pressure-time relationship has great effect upon the temperature factor, for the effective sealer area is only the line of tangency (actually a small area) between the surface of the wheel and the plane supporting the material to be sealed or between the two sealing wheels. If the material to be sealed moves by quickly, the time allowed for heat transfer becomes very short. This situation is sometimes assisted through the use of preheaters which warm the areas to be sealed prior to their

entering the sealer contact. Solvent activators find only limited use and then only under favorable conditions, with this type of motion. If they don't actually and obviously help, they are worse than if not used at all. This is because under this type of motion the outside of the webs to be sealed sometimes tends to adhere to the wheel and the seal, still soft under the influence of the activator, gets pulled apart as fast as it gets made and never gets a chance to set up in position. This has been assisted through the use of pressure belts that hold the seal together throughout all the phases of the operation. Actually, this type of seal failure sometimes occurs without the presence of an activator if the material being sealed has as strong a tendency to adhere to the wheel as it has to cohere with itself. Examples of this are found, under certain conditions, in some papers having both sides lacquered and in some machine operations (rather than hand operations) with rubber hydrochloride film. In the case of materials suffering these difficulties, it is not to be assumed that the machine is a failure nor that the material is inadequate. Rather, the functional qualities or the economy of the heat-sealing material or the special advantages of the equipment should be considered.

Sliding motion is the most widely used method of heat sealing, being characteristic of almost every wrapping machine that uses heat seal for closure. In the case of the wrapping machine it is obvious, from a simple analysis of the wrap formation, that in order to seal all avenues of entry to or from the package, the wrap must be heat sealing on both its surfaces. This means that heat-sealing material will come into contact with the sealing plates along which the wrap slides as the seal is made. Since a fusible material on being heated first becomes tacky, then reaches its fusing point, there is a tendency for some heat-sealing materials to stick to the sealing plates when there is insufficient heat supply to maintain the proper sealer temperature. There also are certain materials, such as the coatings and films derived from rubber, which cannot be made to seal with sliding motion.

Such coatings, even up to the point of decomposition, remain so tacky that they will stick to the sealer so tightly that the wrap, after a very few packages are run, is torn from the package. The case of the rubber-derivative film is much the same. Again, neither material nor equipment is to be condemned.

If there is too little heat supply and a two-side—lacquered material begins to stick to the sealers, it generally is a simple matter to increase the heat supply and to secure good operation.

Many such cases have been remedied when operators realize the fact that, as mentioned above, many heat-sealing agents, while being heated, first become tacky then actually fuse. It is during this insufficiently heated tacky stage that adhesion to the sealing plates most seriously occurs. If the material is one of those that simply will not seal with a sliding motion, its functional advantage or its economy should be weighed in the light of cost of getting new equipment or adapting old equipment to the proper type of sealing motion.

With this type of motion, as with the other types discussed, the temperature-pressure-time relationship is paramount and the temperature must be considered as a problem of heat supply and as a rate of heat transfer within the time available for that transfer.

Much work has been done on the kind of material to be used for the sealers. Copper has been found desirable because its thermal conductivity allows more uniform heat distribution over its entire area and because it resists chemical reaction with the resins used in heat-sealing materials, which often have a high acid number. Brass, easily formed into parts, is widely used and has good thermal conductivity, although it is not so resistant to corrosion as copper. Stainless steel has been widely and effectively used and has given long, satisfactory service. Cast iron is proposed by some engineers, but has not found widespread application, probably due to its sometimes porous structure and lower thermal conductivity.

In this discussion of heat sealing, there has been no attempt to discuss the many ways of taking advantage of heat sealing in actual package form. As a means of mechanical closure, it is simple, direct and can be very sure. It can contribute tremendously to the functional abilities of packaging material because it is the link that completes the chain of protective qualities in a good package, closing the last entry or exit for moisture vapor, water, grease, contaminating aromas, etc. The actual package to be made more effective through heat-sealed closure may be chosen from many forms, as the marketing requirements, the shape, the size or the physical or chemical properties of the product dictate. Bags made from sheet or film with its entire surface capable of heat sealing or made with an imprint enabling heat seal on just the top and/or the bottom, packets made by sealing two sheets of film or paper together around their four edges, pouches made the same way or by folding a sheet back upon itself—these latter in sizes ranging from quite small to very large—liners placed in cartons either as pre-formed bags or as bags formed with heat seals right on the package-forming machine, wraps, plain, printed or transparent, with or without inner supporting carton—all these are forms of packages available through heat sealing. Machines ranging from the simplest inexpensive foot-power crimper to the most complicated automatic package forming, filling and sealing setup are available in wide variety from reputable and very capable engineering firms. Materials ranging from the most ordinary waxed sulphite through the glassines and the lacquered or hot melt coated papers, through the cellophanes with their heat-sealing coatings and the films that are entirely thermoplastic, the specially coated foils, to complex lamination of combinations of these materials with themselves or even more complex laminations of various of the materials so that each may lend its qualities to a combined job on packaging—all are available for heat-sealing work. Each requires its own terms of handling, though many are similar, and each reaches its best use only through cooperation between supplier and user in learning the optimum conditions under which the needed qualities are made most readily available. For further information on this subject, see *Heat-Sealing Equipment*, p. 662.

Adhesives for heat sealing

by Randolph R. Wiggins

A thermoplastic or heat-sealing adhesive has a dual role, being an agent for fabricating and closing flexible packages and also a protective coating when applied all over the surface of a base stock. Since not all adhesives suitable for the heat-sealing operation offer worthwhile protective qualities, for the purpose of this discussion the heat-sealing aspect only shall be considered.

Heat-sealing adhesives of today represent compromises necessary because of the inherent limitations of available materials. The ideal heat-sealing adhesive should embody the following characteristics. It must be compatible with the surface to which it is applied. In the case of the hot melt or molten type, it should be capable of application at a moderately low temperature because of the dehydrating effect of heat on paper and films and to a lesser extent the destructive effect of continued elevated temperatures on the machine used in the application. In the case of the liquid adhesives, which include both solvent and emulsion types, a high solids content and a low viscosity allow a maximum of material to be applied with a minimum of drying. After the adhesive is applied it should be non-blocking and of course non-toxic in all cases where it is used on the interior of a food package. Finally, since one of the chief reasons for the increasing use of thermoplastics is the gain in production over the older pasting methods, the application of the heat-sealing compound should not slow up the printing press or fabricating machine when it is made in conjunction with these latter operations. Of the three general types of heat-sealing adhesives, emulsion, solvent or laquer, and hot melt, each has applications for which it is especially adapted.

The variety of active ingredients which may go into these three types is wide even in spite of wartime restrictions. They include such materials as straight paraffin wax such as is used for heat sealing ordinary bread wrapper, microcrystalline waxes, vinyl polymers, acrylic resins, rubber derivatives such as Pliolite and chlorinated rubber, polyethylene, cellulose derivatives for example, ethers, esters and nitrocellulose, alkyd resins, polyamides, and dextrin-resin and zein-resin combinations.

In the case of heat-sealing emulsions the possible selection of raw materials is wide. The factors governing the choice include compatibility with the material to be sealed, final plasticity desired and ease of emulsification. The chief drawback in the case of emulsions is that they are often slightly tacky when dry inasmuch as it is extremely difficult to drive out the last traces of water from the applied film of adhesive, and blocking is likely to occur in stock which is wound in rolls, or in cartons of finished units packed tightly together, for subsequent heat sealing. The water in emulsion type thermoplastics often causes a certain amount of wrinkling on paper and non-moistureproof cellulose film which may be objectionable from the point of view of appearance.

Hot-melt thermoplastics may be formulated utilizing practically all the wide variety of materials listed above. The factors influencing the choice of raw materials for this type adhesive are melting point, viscosity desired which is dependent in turn on the type of machine used for application and the stock to which it will be applied, and, to a lesser extent, cost, where this type of heat-sealing adhesive is used for the high speed production and sealing of cheap packages. Blocking difficulties are usually seldom encountered with hot-melt adhesives since the addition of cellulose derivatives and waxes usually overcome this defect. One of the most important factors to be considered in the case of hot-melt adhesive is that special machinery is necessary for application. This machinery is expensive as compared with that used for the application of solvent and emulsion adhesives, since it must be specially designed for particular jobs, and its life is short because of the detrimental effects of the high temperatures at which it must necessarily operate. Solvent and emulsion adhesives can usually be applied from ordinary pasting or they can even be applied from conventional printing machinery.

In spite of the advantages of the newer hot-melt and emulsion type of thermoplastics, the solvent or lacquer type still affords the greatest latitude for formulation to obtain adhesives for special jobs. The various cellulose derivatives can be employed in such lacquers for their film-forming and anti-blocking properties. Since practically every thermoplastic resin can be incorporated into a lacquer-type adhesive, cheap adhesives of this type can be formulated, which, when used in relatively small amounts, do a better and cheaper job than glues and pastes.

An important factor in using heat-sealing adhesives in place of glues and pastes is a complete understanding of the process involved. After the adhesive has been applied and dried, or set, in the case of hot melts, for subsequent heat sealing, the thermoplastic must be reactivated under the influence of both heat and pressure at the time when the seal is to be made. Pressure must be continued after the application of heat until the seal has cooled somewhat. The seal sets as soon as the temperature has dropped a few degrees below the minimum temperature necessary for sealing and the pressure must not be removed before this has taken place.

One of the problems encountered with the use of thermoplastics in the case of laminated stocks is that of delamination. This is especially noticeable in the case of laminations including heavy paper stocks. This phenomenon is due to both the low heat transfer rate of heavy papers, the low melting points of the usual laminating agents which often contain a high percentage of waxes. The solution of this problem lies in decreasing the sealing temperature to a minimum and increasing both the time and pressure factors to compensate for it.

What to tell your adhesive supplier

by G. B. Cloran

Just as a doctor needs to have a case history, the supplier of any material can serve his customers better if he knows their problems. Many adhesive uses are highly specialized, virtually calling for individual "prescriptions." Here are some suggestions as to what your adhesive supplier should know in order to give you the proper material for your purposes:

Product consideration

Tell what the product is and submit sample if possible. What are its physical characteristics? Does it sift? Is it a transparent liquid? A brittle material? Is it hygroscopic? Does it absorb odors?

Is it packaged for stock or on special order? What is the packaging season?

What are the prevailing climatic conditions where the packaging is done?

Package material considerations

Submit several representative samples cut to exact size, and indicate where adhesive is to be applied.

Paper—Is it a label, wrapper, bag? Is it kraft, bond, sulphite, glassine? Is the stock litho coated, book, antique, or otherwise finished? Is it plain, heavily inked, varnished, lacquered, dry or wet waxed, pyroxylin or otherwise coated or impregnated? Is it laminated? If so, what laminant was used . . . asphalt, wax, resin, starch paste? Is it heavily sized, calendered, embossed? Is it colored, and if so, are the dyes sensitive to alkalies, acids, water? Is it trimmed accurately to size? What are the dimensions? What is the grain direction of the paper . . . parallel with or perpendicular to the printing?

Cardboard—Is it a folding or set-up box, seal-end or tuck-in flap carton, solid-fibre or corrugated case, spiral or straight-wound tube? Is it ordinary chip or straw board, clay or pyroxylin coated, dry or wet waxed, silicated or otherwise greaseproofed or moistureproofed? What point board is it? What ply? What are the dimensions? Is it colored, or plain, sized or porous, rough or smooth? Is it uniform? Is it accurately trimmed? Is it lightly or well scored?

Wood—Is it soft or hard, rough or smooth, green or aged wood? How is the surface finished?

Glass—Is it a bottle, jar vial, ampul? Is it plain, frosted, stippled, flint glazed, opal? Is the labeling surface round, flat, convex, concave, or singular? Is it labeled wet or dry, clean or greasy? What is the temperature of the surface when labeled?

Tin—Is it tin plate, tern plate or black plate? Is it plain, lithographed, enameled, lacquered or painted? What is the shape of the container—round, square, oval, tapered? Is it clean or greasy, wet or dry? What is the temperature of the surface when labeled?

Foil—Is it tin, lead or aluminum foil? Is it backed with paper or board? (If so, describe stock and laminant as indicated above.) Is it plain or lacquered? Is it smooth or embossed? What is the foil thickness?

Molded plastics—Is it Bakelite, Tenite, Lucite, etc. (For types, see *Plastic Materials Used in Packaging*, p. 575.) Identify the manufacturer.

Transparencies—Is it a viscose film such as cellophane, acetate such as Kodapak, rubber-base such as Pliofilm or the polyvinyl type? Is it rigid or pliable? Is it a label, wrapper, bag, box or window?

Production considerations

Type of operation—Is it spot or is it overlap labeling? Tight or loose wrapping? Carton, case, or bag sealing? Tube winding, box forming, bundling?

Method of operation—Is the adhesive applied by hand or machine? Give the make, model and manufacturer's name of any packaging equipment involved.

Type of application—Is the adhesive applied *indirectly* from a table, transfer, roller, picker, dauber; or *directly* . . . by glue roller, silk-screen, paste belt, paddle, force-feed device, spray?

Speed of operation—How many packages are completed per unit of time? How long is the glued area held under pressure? By what means is pressure exerted . . . compression unit, stacking, etc.?

Operating conditions—What is the packaging room temperature and humidity? Is the machinery new or in good condition? Is it suited to the work and properly cleaned, adjusted, oiled? Is the help inexperienced?

Special processing—After sealing, is the package steam-sterilized, wax dipped or otherwise treated?

Re-use—Are the empty packages returned for re-use?

Field considerations

The market—Where is the product sold . . . in what localities and climates?

Shipping conditions—What types of carriers are used . . . trucks, railroads, ships, airplanes? Is the shipping container exposed to the elements in transit? Are special shipping facilities employed (heated or refrigerated cars, etc.)?

Storage conditions—Where will the package be stored —in open spaces, cold sheds, heated warehouses, frozen food lockers? How long is its shelf life?

Consumer handling—Will the package be handled with wet hands? Will it be re-used by the consumer? Will it be placed in ice water, damp cellars, steamy bathrooms?

Laws and regulations

Must the package comply with pure food or drug regulations, B.A.I. or government wartime specifications, or other Federal, state, trade or religious requirements?

Adhesives for weatherproof cases

Among developments made imperative by war demands was that of water-resistant adhesives. The conditions of transport and storage which had to be met by shipments of food and ammunition to our armed forces required a completely waterproof container, and the waterproof adhesives perfected for use in corrugated and solid fibre shipping boxes helped to meet the demand. Such weatherproof containers are now specified by all branches of the service for overseas shipments. Ammunition, airplane parts, clothing, electrical equipment and food of all kinds must be packed in these boxes for shipment to all theatres of operation.

When our country entered the war, the urgent necessity for weatherproof shipping containers immediately became apparent, for shipments had to meet conditions which differed radically from those encountered in ordinary export trade. The ideal container had to meet numerous rigid specifications. For one thing, to save critical cargo space it had to be light. At the same time, it had to be strong to ensure against damage which might result in lost lives. It had to hold up as well in arctic and tropical climates as in our own zone. It had to be able to withstand a 24-hr. immersion in water without falling apart. The final, and by no means the least important or most easily solved demand, was that it be made of paper which was specially treated so as to be water resistant. The first answer to these requirements was the solid fibre box made with 4 or 5 plies of paper and combined with a water-resistant adhesive.

But for some shipments, the corrugated container promised to be even more satisfactory. Adhesives laboratories, cooperating with representative corrugated box manufacturers, promptly started work on the development of a water-resistant adhesive which would be satisfactory for combining corrugated board. The adhesive requirements for the corrugating operation were even more rigid than the requirements for solid fibre. This is because water contracts every part of the board, including the tips of the flutes where the adhesive had been applied when corrugated board is immersed in water. Many difficulties were encountered in developing the paste as well as in perfecting a satisfactory water-resistant liner board and a water-resistant corrugating medium.

Today, weatherproof corrugated board may be combined with starch adhesive prepared by a special formula, at combining speeds almost comparable with those used in the production of non-weatherproof board.

Weatherproof corrugated boxes produced in the United States have withstood every conceivable condition of weather and climate in all parts of the world, and they have been able to deliver their contents undamaged. In South Pacific and in European landing operations, such boxes when thrown into the surf from landing craft, have floated ashore almost without damage.

A war baby in every sense of the word, weatherproof containers made with water-resistant adhesives appear to have an important peacetime future. Failures in export and domestic shipping which were tolerated before the war will no longer be necessary. These new containers, for example, will probably be used for all types of bottled goods, since a broken bottle which spills its contents inside the box will not cause the liners of such containers to separate as is the case with non-weatherproof boxes. It is possible, too, that such items as shipments of fish may move in weatherproof boxes since ice can be packed around them in transit without harm. Other possibilities include shipments in refrigerated cars. For export, particularly to the tropics where very high humidity conditions prevail, they will be most valuable.

The actual extent of their peacetime use cannot, of course be foretold accurately, but it is believed that weatherproof containers are here to stay.

Material for this article was especially prepared for the 1945 **Packaging Catalog** by L. F. Turnbull of Stein, Hall & Co., Inc.



Weatherproof adhesives play an important part in safeguarding military supplies. Civilian shipments will seldom be subjected to such handling hazards, but the war lessons which stimulated development of these new adhesives will carry over into civilian shipping practices. Photo, U. S. Signal Corps.

TABLE I.—CHARACTERISTICS OF ADHESIVES

A. SOLVENT (Liquid-Activated) Types: (At least one of the surfaces being adhered must permit the diffusion of the volatile liquid ingredient which usually plays no part in the final bond)

AQUEOUS PHASE CONTINUOUS			NON-AQUEOUS PHASE CONTINUOUS	
Aqueous Adhesives that are true (or nearly true) solutions	Colloidal Solutions		Lacquer-Type Adhesives that are true (or nearly true) solutions in organic solvents	Colloidal Solutions
	Of materials that dissolve and usually have an affinity for water. Usually viscous	Dispersions or Emulsions of materials that have little affinity for water, in water or in other aqueous adhesives.		
	Commercial types			
Slow drying Vegetable Adhesives	Most Aqueous Vegetable Glues Silicates Many Cold Protein Glues Gum Arabic	Natural and/or synthetic resin and/or rubber emulsions	"Cellu-Gums" Clear Lacquer Adhesives for transparent sheetings	Wax Gums

B. CEMENTS: (Both faces may be impervious to all vapors from solvents)

THERMOPLASTIC CEMENTS		CHEMICAL CEMENTS
Aqueous Types	Non-Aqueous Types	Synthetic Resins (Polymerization or Thermosetting Types)
Commercial types are:		
Some Flexible Animal Glues (where loss of water not necessary to the final bond)	Hot Melts	Synthetic Resins

TABLE II.—TYPES OF ADHESION AND SUITABLE ADHESIVES

Type of Adhesion	Surface Requirements	Type of Adhesive	Used on	
Penetration Bond	Both surfaces must be absorbent, wettable by adhesive, and permit the diffusion of the solvents	Usually cold aqueous adhesives of solvent type that dry out to brittle films. (Any type that dries to a brittle film would utilize this type of bond)	Porous Materials	Open Paper Stocks (See Note 1.)
Plastic Bond	At least one surface must permit diffusion of solvents	Solvent Adhesives that dry out to Plastic Films	Smooth, usually less porous surfaces	e.g., For Aqueous Adhesives—Glassines, Bond Papers For Lacquer Type Adhesives—Transparent Tissues
	Neither surface will permit the diffusion of solvents, i.e., impervious surfaces	Cements, e.g., Thermoplastic Adhesives	Smooth, non-porous surfaces	e.g., Foil to Itself Certain Plastics (See Note 2.)

A special case for "solvent adhesives" occurs where two surfaces of the same material are soluble in some solvent which can be used to partly dissolve the surfaces and form a solute bond or weld after the solvent has evaporated. This case merely falls in the class of solvent-activation or re-moistening as the solvent is not the adhesive. An analogous case for "cements" is where two surfaces of the same material are thermoplastic and so can be heat-activated and welded together.

Note 1: Thin films should be used as glues giving penetration bonds generally dry to inherently brittle films.

Note 2: Plastic bonds are also made between porous surfaces; glue film may be thick.

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CHARACTERISTICS, TYPES, PROPERTIES

TABLE III.—SUMMARY OF PROPERTIES AND US

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Wax Gums
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ICAL CEMENTS
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setting Types)

Synthetic Resins

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cks (See Note 1.)

For Aqueous Adhesives—
Glassines, Bond Papers
For Lacquer Type Adhesives
—Transparent Tissues
Foil to Itself
Certain Plastics (See Note
2.)

some solvent which can be
merely falls in the class of
re two surfaces of the same

films.

Property of Surface	Commercial Examples	Type of Adhesive		
		Solvent		Ceme
(Age-proofing)		Aqueous	Non-aqueous	Thermop
Neither Greaseproof nor moistureproof	Most ordinary papers, kraft papers and paperboard for converting (permit ready diffusion of water and other vapors)	Most generally used	OK for water-resistant bonds	Non-aquec OK for resistant
	Wood	Generally used	Usually NG	Chemical for wate ance
Greaseproof	P. T. Cellophane, Acetate permits the diffusion of moisture - vapors of organic solvents	Frequently used	OK for water-resistant bonds	Thermopla also OK water re and no odor de
	Glassine, Greaseproof Paper, Parchment (permit the diffusion of moisture but not the vapors of organic solvents)	Frequently used	NG	Thermopla OK
Moistureproof	M. P. Cellophane, M. P. Acetate lacquered glassine	NG	OK	OK
	Pliofilm	NG	OK	Material thermo
Moistureproof and Organic-Solvent-Vapor-Proof	Many Plastics, Metallic Foils	NG	NG	OK

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XUM

ES AND USES OF ADHESIVES

hesive		Requirement of Final Bond	Nature of Adhesive
	Cements		
	Thermoplastics		
s	Non-aqueous types OK for water-resistant bonds	Frequently penetration bond of low tensile strength but stronger than the stock	Generally the several types aq. vegetable glues, silicate Hot aqueous protein glues where high tack necessary
	Chemical cements for water resistance	As above but need higher tensile strength to be stronger than stock	Aq. vegetable glues (occasionally) Aq. Protein Glues (e.g., Fish, Animal, Casein) Types Chemical Cements (e.g., Plywood Resin)
r- s	Thermoplastics also OK where water resistance and no solvent odor desirable	Generally Plastic Bond	Aqueous (Latex and Vegetable) Glues and Lacquer-types adhesives most often used
	Thermoplastics OK	Generally Plastic Bond	Usually slow drying, aqueous vegetable glues
	OK	Plastic Bonds	Usually slow-drying lacquer-type adhesives
	Material itself is thermoplastic	Plastic Bond	Usually heat-sealed to itself
	OK	Plastic Bond	Thermoplastic resin type adhesive

XUM



Types of gummed tape

by Juan Oliver

When a prominent gummed paper manufacturer was asked, 20 years ago, to list the uses of gummed products, he was able to name only eight. Today, there are at least a thousand, for there is scarcely an industry which does not employ gummed paper products in the form of labels, stickers, wrappers or sealing tapes. The gumming industry today makes products ranging from the gummed papers used for purely decorative purposes to heavy-duty waterproof gummed tapes. (See also *Adhesives for Weatherproof Cases*, p. 356.)

Gummed products fall into two categories: sealing tapes, sold in rolls, and flat gummed sheets for wrapping or converting.

Sealing tapes play a decisive role in the efficient preparation of containers for transportation. They can literally "make or break" a container. The following is a list of the more commonly used gummed tapes:

Standard gummed tape—35-lb., 60-lb. and 90-lb. gumming kraft, gummed on one side with animal or vegetable glue or dextrine adhesives. These tapes are made in brown as well as in a variety of other colors—red, green, orange, etc., and they may be printed to show the customer's trademark or brand name. They are usually sold in narrow rolls to fit standard sealing tape machines, and are used for sealing parcels, bundles or cartons, the heavier weight being selected for heavier duty.

Extra-heavy gummed kraft, 100—160 lb., are used as protective coverings for the edges of such heavy articles as bathtubs, basins and automobile fenders to prevent chipping and scratching during transportation.

Stay paper—90-lb., 100-lb. and 120-lb. kraft, coated on one side with a special high-test glue which has very fast-sticking qualities. It comes in brown and in a variety of colors, and is usually made with a slight crease down the center. It is applied to cover the stitches and to reinforce the corners on lightweight boxes.

Reinforced crepe kraft—The priority on sisal has brought about an efficient substitution in the form of a creped kraft tape reinforced with thread, laminated with asphalt and combined with 60-lb. gummed kraft. It is used on the "manufacturers joint" of fibre containers.

Gummed veneer tape—35-lb., 40-lb., 50-lb. and 60-lb. kraft, gummed with specially blended high-grade glue for high-speed taping of wood veneers. The glue must be free of acids or other ingredients which might destroy the finish of the wood. Veneer tape is used to hold two strips of veneer together until they are firmly adhered to the underlying structure. The tape is then sanded off. There is also some demand for a 35-lb. unsized kraft which is moistened and then removed without sanding.

Corrugated cambrics come in two types: duplex paper combined with cloth and gummed on the paper side, and clay-filled, a gummed cloth which had previously been impregnated with clay. Both are used by the fibre container industry to make the "manufacturers joint" which is an indispensable part of each box. They are made in various weights which may be employed in the manufacture of boxes with different test specifications.

Gummed Holland—Clay-filled gummed cloth used primarily for binding and edging by bookbinders, lampshade, writing pad and envelope manufacturers.

Gummed Albert and Kleco—These are the same type as gummed Hollands, but are stronger inasmuch as the cloth has 2½ times as many threads as the Hollands.

Gummed tablet tape—Embossed paper tape used by tablet manufacturers as binding on pads, etc.

Gummed glassine tape—Transparent gummed paper used for mending dollar bills and torn paper of all kinds.

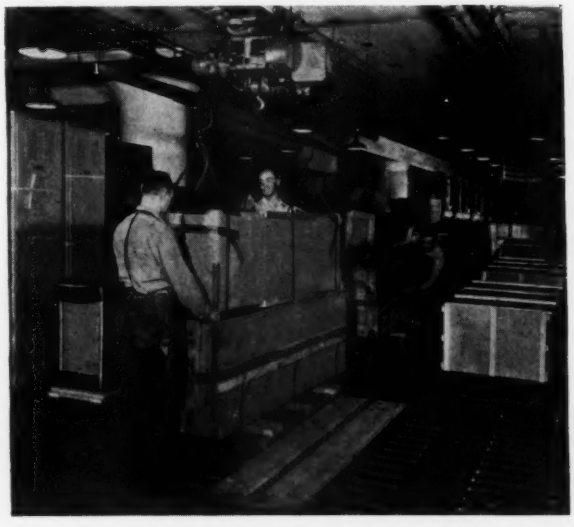
Waterproof sealing tape—Solseal is an asphalt-laminated paper, coated one side with waterproof glue. It was developed for substitution of waterproof fibre containers for wood and metal. The waterproof tape forms an efficient seal for such containers, and ensures the maintenance of moistureproof conditions for overseas shipments as well as for the cold storage of perishables.

Waterproof paper—This is made of two layers of kraft, 30 lb. or 60 lb., laminated with asphalt. It is used as wrapping and lining material for the maintenance of moistureproof conditions on railroads, steamships and in warehouses to prevent spoilage of perishables. The electrical and automobile industries also use it for wrapping on fenders, motors, etc., to prevent rusting.

Cloth-lined paper—Cloth, combined with paper, used for the manufacture of tags and labels.

Gummed label papers—For labels, seals, reinforcements and decorative purposes. These come in a variety of paper, coated and uncoated, white and colored.

Tape-sealed liner for protection of teletypewriter equipment going overseas for military use. Photo, Kearny Work, Western Electric Co.



XUM

Pressure-sensitive tape

by George E. Chisholm

Pressure-sensitive adhesive tapes are those which adhere readily with finger pressure to dry surfaces. They do not require moistening to adhere, and are removed readily by stripping from the surface. If the surface is free of dust, lint, or fibres, the tape may be removed and re-applied a number of times.

There are many types of materials that serve as the backing for these tapes. Among those which are used commercially today, either individually or in combination, are the following: paper, cellophane, cotton cloth, coated cloth, acetate film, acetate cloth, metal foil, glass fibre, and asbestos fibre

The determining factors in the choice of backing material for a given job include the following (though not in this particular order):

1. Strength
2. Thickness
3. Pliability
4. Transparency
5. Color
6. Insulating qualities
7. Resistance to moisture and exposure
8. Resistance to paint solvents, sandblasting, electroplating chemicals and other finishing processes

To the packaging fraternity, perhaps, it might seem unusual to talk about packaging a tank for overseas shipment—yet that is a job that has been done with every tank that has gone to our armed forces and to those of our allies. The job called for a strong, pliable tape that will resist moisture and exposure to the elements in every type of weather condition. The job is being performed by sealing up every opening in the tank with "shingled" layers of a specially coated cloth tape which is then spray-coated with a compound which adds protection against rigorous exposure to salt spray, heat and cold.

Pressure-sensitive adhesive tapes are used for a wide variety of industrial, commercial and household uses. Uses may be grouped in eight functional classifications:

1. Masking
2. Sealing
3. Holding
4. Identifying
5. Protecting
6. Insulating
7. Cushioning
8. Reinforcing

One of the largest industrial uses is that of masking. In this use, the tape protects those parts of a material which should be "stopped off"—usually in a finishing operation. For example, in the spray painting of automobiles, tape is used to "mask out" metal parts, glass, or other parts of the car along a line where the tape is applied. A specially treated paper tape that will resist paint solvents is used for this purpose. The same method of masking is used in spray painting Air Corps insignia on combat planes, or in the finishing of railroad cars and buses. In fact, wherever the spray gun is used in finishing operations, masking tape is likely to be used.

The number of industrial uses for pressure-sensitive tapes is endless, and from the standpoint of packaging, the uses are too numerous to attempt a listing here. All we can do is to suggest some of the more basic applications. Of the eight functional classifications of tape uses, the following are most often found in packaging:



1

1—Pressure-sensitive tape is used to supplement the closure of Dugan's metal container for cookies, in this way making the package more tamperproof. Photo, Industrial Tape Corp.

1. Sealing
2. Protecting
3. Holding

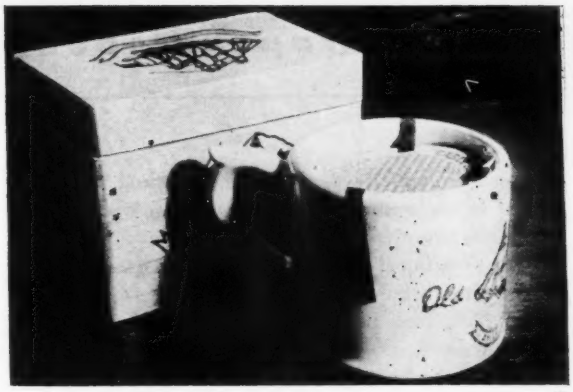
The tapes which are most often used are:

1. Cellophane (transparent and colored)
2. Acetate fibre (a lamination of acetate film and rope fibre)
3. Cotton cloth
4. Coated cloth (for moisture resistance)

A listing of the more common uses of these tapes in packaging would include:

1. The sealing of packages of all kinds with cellophane tape (transparent or colored). Examples: Boxes of candy, hosiery, food products, stationery, cookies and almost any packaged article where a cover must be held on a closure, or a wrapper held in place
2. The holding of paper bands around such articles as shirts, socks, shorts, stationery, etc., with cellophane tape (transparent tape is usually used)
3. The combining of units in a combination deal by holding them together with cellophane tape (usually transparent but in some cases colored). These combination deals include different varieties of the same products (such as soaps) or related products (such as razor blades and shaving cream)
4. Attaching samples to a packaged product or to a bottle or other container (usually with transparent cellophane tape)
5. Attaching premiums to packaged merchandise with cellophane tape
6. Attach key openers to cans with cellophane tape
7. Sealing canisters with cloth tape, leaving a tab for easy removal. Different colors or printed tapes may be used to identify the contents. This form of sealing is used on canisters containing large caliber shells. By means of the tab, the canister may be zipped open in merely an instant.
8. Banding heavy merchandise with cloth tape to keep sets together. Examples: brake linings, heavy hinges, casters, etc. (facilitates handling and inventorying)
9. Sealing shipping cartons with cloth tapes. The fact that no moisture is required means that the tape may be applied quickly and that the tape can be removed as quickly. In some cases colored tapes are used to indicate the nature of the contents. In other cases printed tapes are used for the same purpose
10. Sealing packages for overseas shipment when they are to be packed in shipping cases for moistureproof protection. Both coated cloth tape and acetate fibre tape are used for the wrapping of machinery parts, tools, etc., for overseas shipment, as protection against rust and corrosion. These smaller packages are sometimes wax-dipped for further protection. They are then packed in shipping cases which are lined with special waterproof papers
11. Sealing shipping cartons with moistureproof cloth tapes when the contents require protection from moisture. Coated cloth or acetate fibre tapes may be used, depending upon the amount of strain, the size of the carton, and the degree of protection required
12. For the export shipment of automobiles, trucks, farm machinery and other heavy machinery, coated cloth tapes are used to protect against exposure to the elements. Openings are sealed up with this tape to protect delicate motor parts, instruments and bare metal surfaces
13. Tremendous quantities of this tape have been used for the shipments of tanks, planes and other military equipment, to the armed forces in the various theaters of war. The tape is applied readily and is stripped off quickly when the equipment arrives overseas. Reconditioning at the point of arrival is avoided

Wherever quick application and removal are desirable, pressure-sensitive tapes are ready to answer the call.

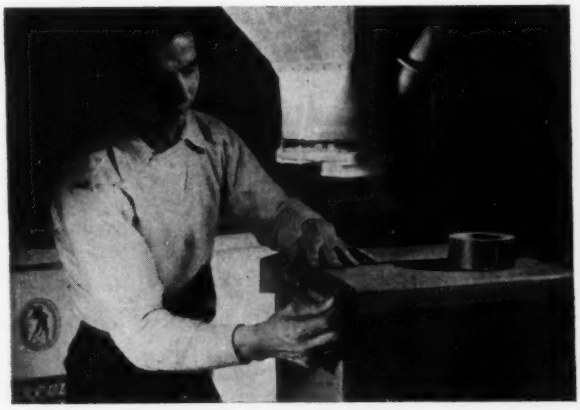


2

2—Shaving soap in a mug calls for a protective closure of paper held in place by short strips of cellophane tape, the color of which lends a bright note to the package. Photo, Industrial Tape Corp.

3—Special waterproof pressure-sensitive cloth tape provides an effective seal for shipping containers. Photo, Industrial Tape Corp.

3



Tacky-tape dispensers and affixers

by T. H. Krueger

The now universally used "gummed sealing tape" was limited in use until efficient dispensers were developed. Dispensers are even more necessary for using the more recently developed pressure-sensitive or "tacky" tape, for the conservation of both labor and material. A three-inch width of the latter is many times the cost of the ordinary gummed tape. When no dispenser is used, about one-third of the "tacky" tape may be wasted just in tearing it off the roll.

Types of dispensers

One modern dispenser, built for industrial use, feeds several strips at one stroke of the crank. Strips are cut simultaneously and held in convenient pickup position. Two or three strips may be picked up at once. This type is intended for use where many small packages are to be sealed. This type of dispenser, however, is not intended for use with cloth tape.

Another type is an affixer designed for continuous production of boxes or packages. A push of the box along the surface of the packing table affixes the tape—cellophane or paper up to one inch in width—first to one edge of the box then to the other. This style can be placed in a conveyor line or—under patent license—it can be placed on a wrapping machine.

War needs have called for "tacky" tape in widths of 2 to 3 inches and lengths ranging from 4 to 36 inches. Dispensers have been developed for these uses. One of these measures 1- or 3-in. tape in lengths up to 12 inches. Another model measures lengths up to 36 in. with an indicator to keep track of the feed. Both types can be set for any two desired lengths, either of which may be dispensed at will.

Either of these models can be furnished for cloth tape as well as paper, cellophane or laminated tapes. Users should specify which application it is their intention to make.

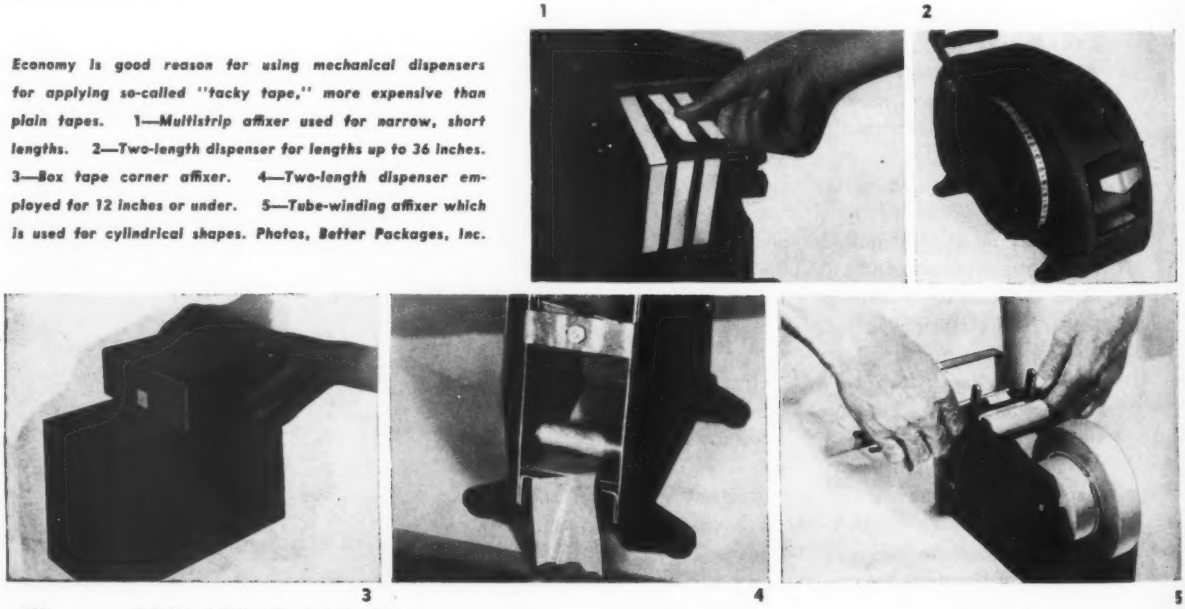
A comparison indicates the urgent need of measuring devices: A candy box, sealed with cellophane tape uses two 1-in. lengths of tape 3/8 in. wide—an area of 3/4 sq. inch. A fibre shipping case uses on an average two strips 3 in. wide by 24 in. long and four strips 3 in. wide by 10 in. long—an area of 265 square inches. Assume a 20 per cent waste of tape—which is hardly apparent to the observer—this amount of wasted tape would be enough to seal 58 candy boxes!

In industrial plants of many kinds, printed tapes are used to identify a wide variety of items. A "tube winder" device is available which affixes the identification tape in much less time than is required by hand operation. No tape is wasted when this type of winder is employed and the package is neater.

Both manual and power-driven machines are used for winding cloth tape around cylindrical canisters, thus making sure the tape is placed so as to form a hermetic seal. A tab for quick removal of the tape seal is provided by some of these machines.

In general, pressure-sensitive tapes have really developed their own new uses and in these fields they are supreme in efficiency.

As in other fields, many of these uses are war-born, but many are here to stay. Properly designated and well built dispensers are doing much to place this new tool of industry on a solid foundation. (For information about shipping uses of such dispensers, see *Equipment for Applying Tape*, p. 801).



Economy is good reason for using mechanical dispensers for applying so-called "tacky tape," more expensive than plain tapes. 1—Multistrip affixer used for narrow, short lengths. 2—Two-length dispenser for lengths up to 36 inches. 3—Box tape corner affixer. 4—Two-length dispenser employed for 12 inches or under. 5—Tube-winding affixer which is used for cylindrical shapes. Photos, Better Packages, Inc.

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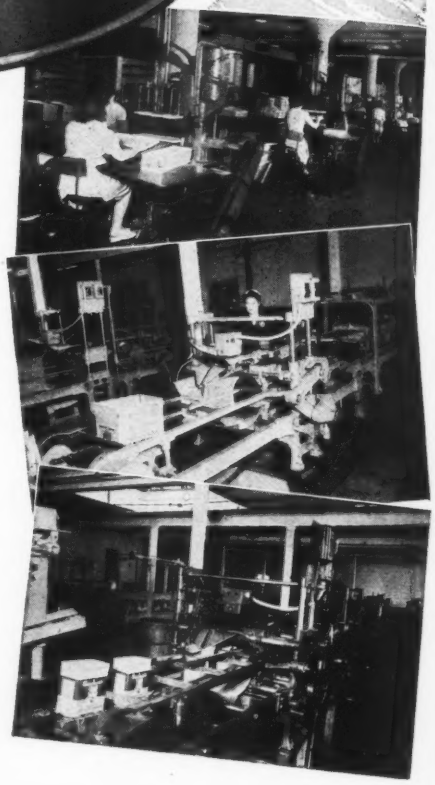


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Note this carefully ... at National the solution of any adhesive problem is not limited to formulations of a single type or a limited group of resins. All types, both singly and in blends of high complexity, are employed. *And each recommendation of a resin product must justify itself competitively with every other type of adhesive.*

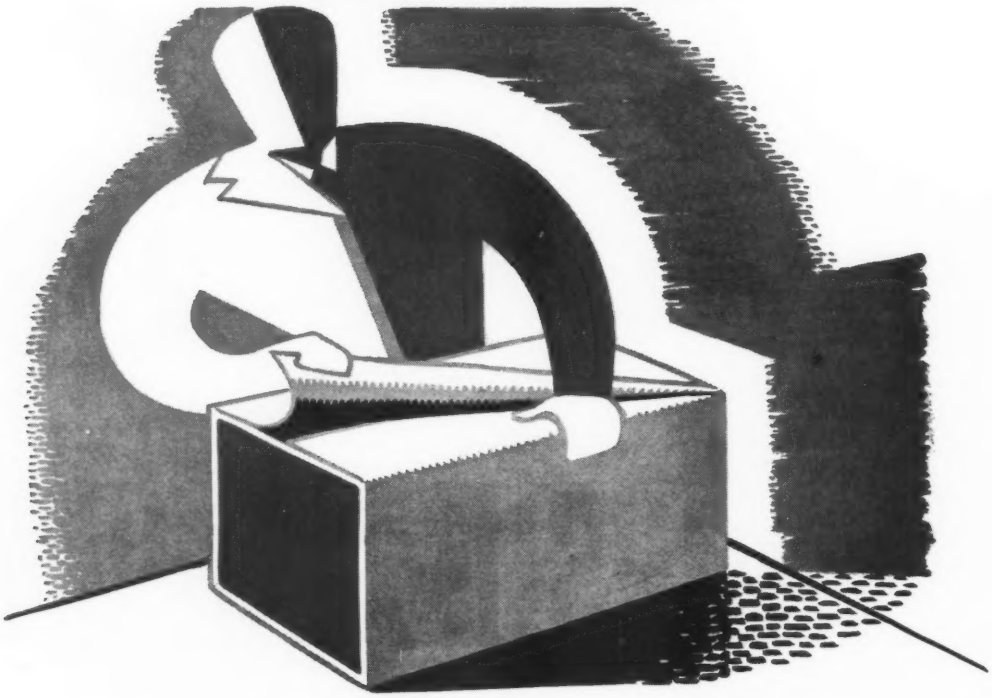
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And Texcel is one tape whose "stick"
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It won't dry out - it won't fall off.
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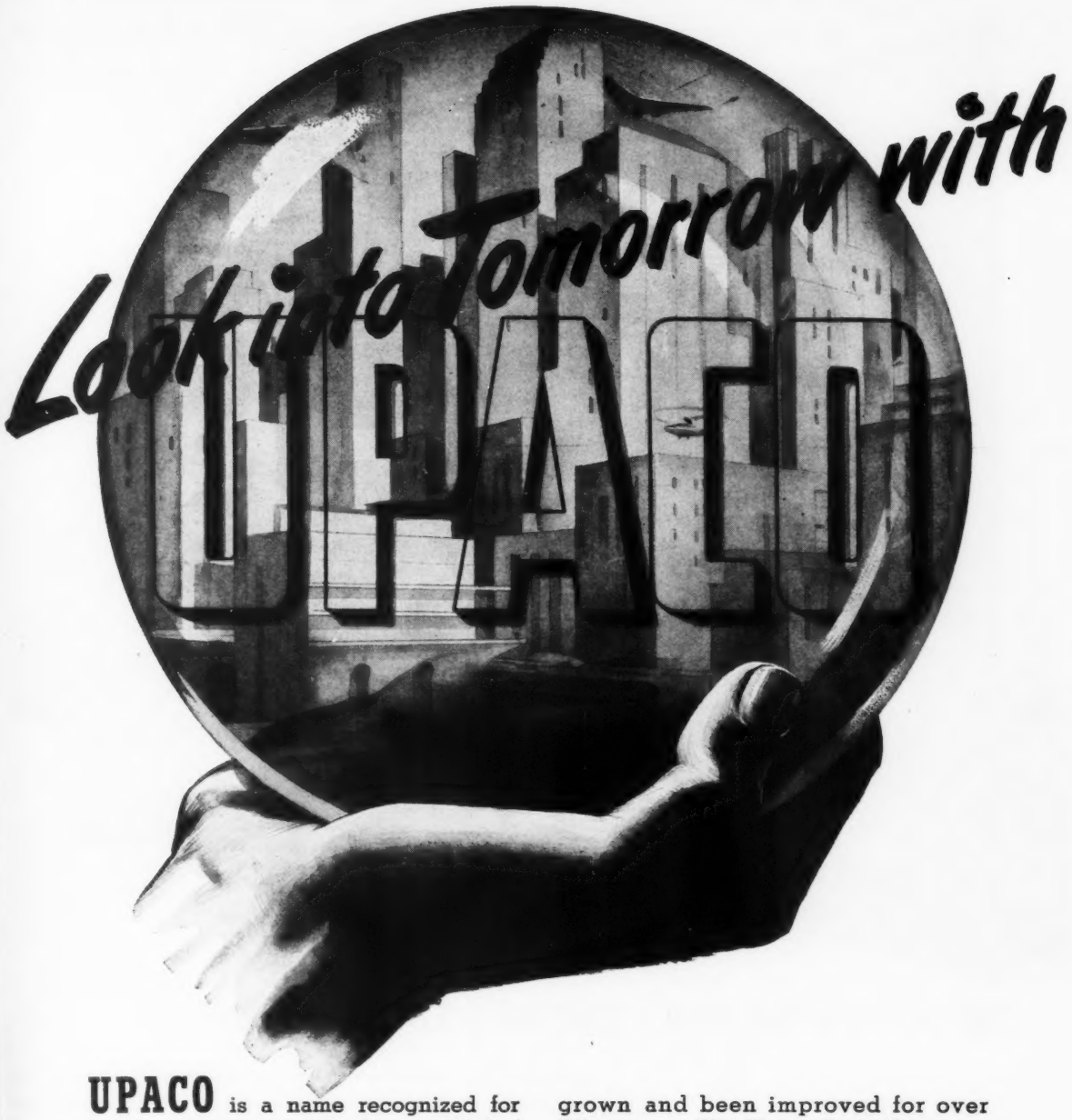
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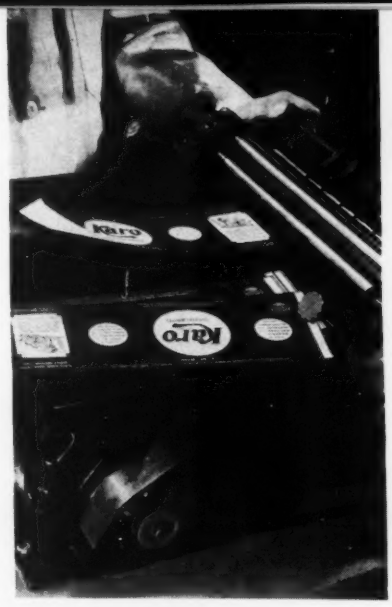
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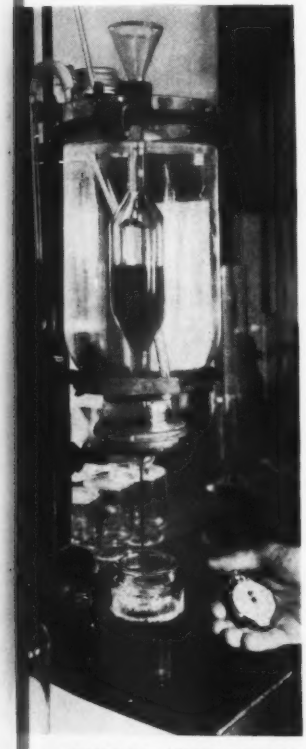
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Starch Bases....	Dextrines, Flours (Tapioca, Corn, Potato)
Animal Bases...	Hide, Bone, Gelatine, Fish..
Protein Bases...	Casein, (Prepared liquids).
Resin Bases....	All types of synthetics (emulsions and solutions) and hot melt thermoplastic coatings, laminants.
Rubber Bases ..	Synthetic rubbers, reclaimed rubbers, latex.
Asphalt Bases ..	Emulsions, specially compounded.
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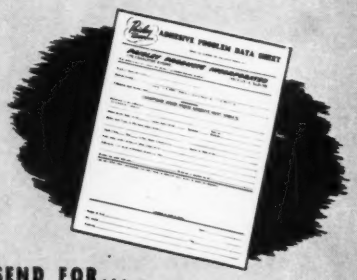
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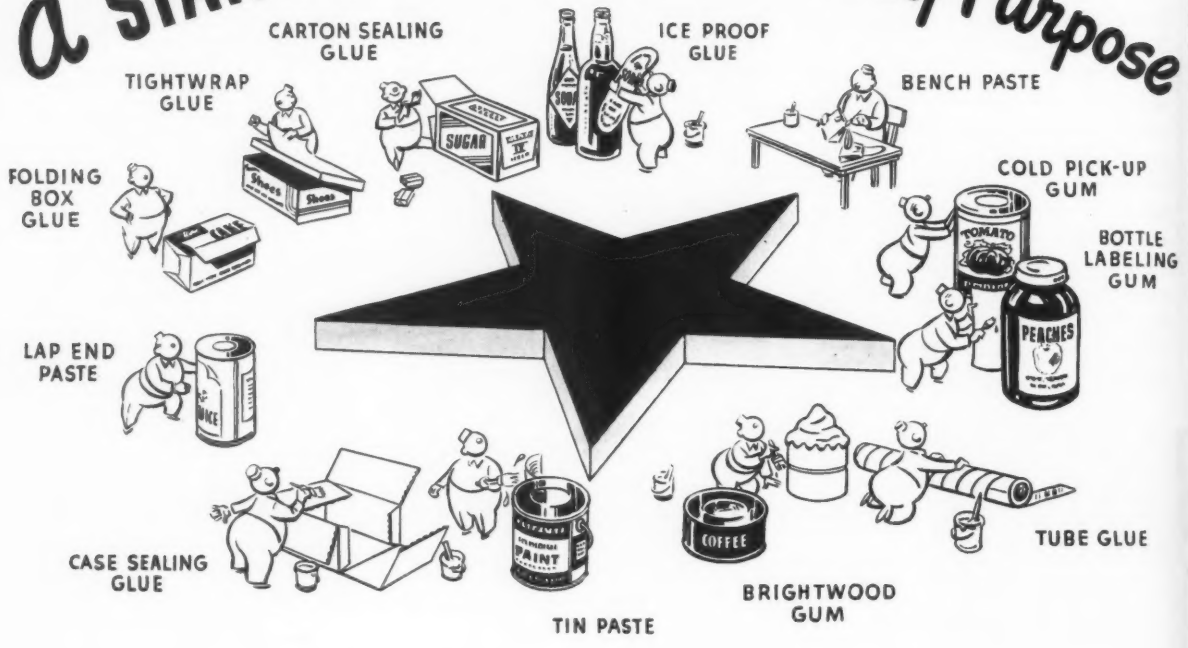
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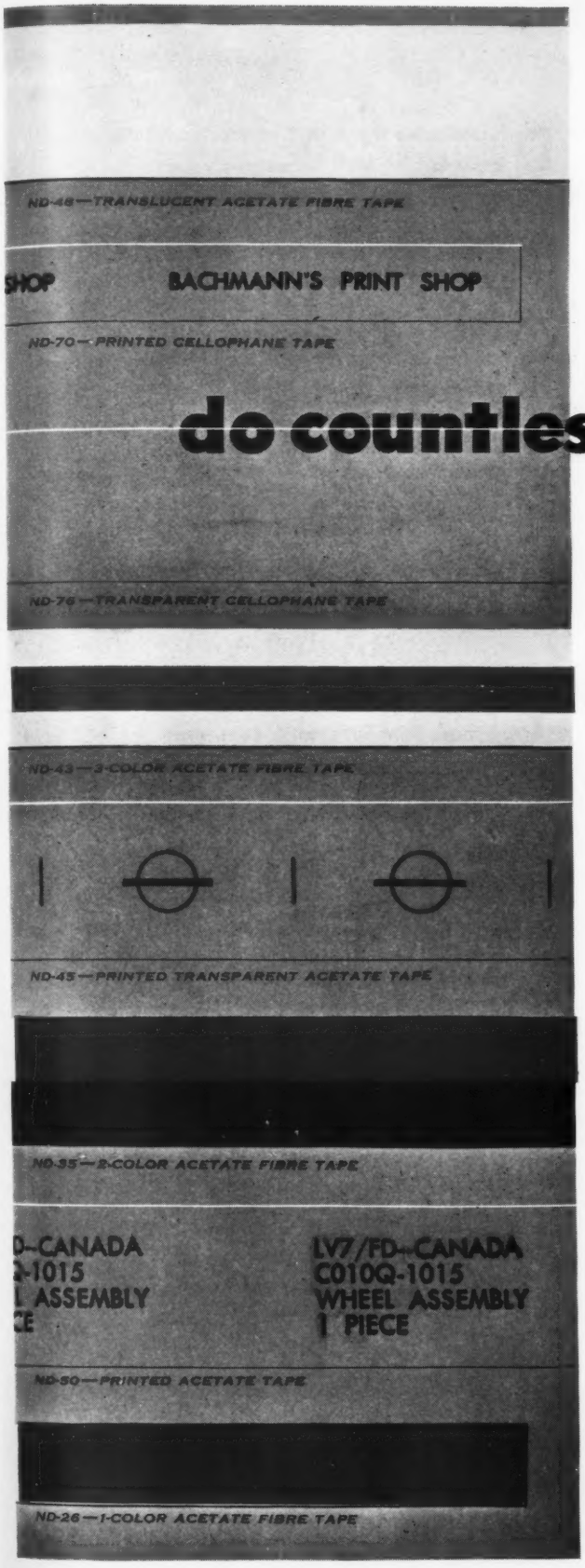
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COATINGS

What to expect from coatings 376

Technical aspects of resinous coatings 378

Paper coatings 384

Coating impervious papers 386

Developments in waxes 388

Uses of asphalt 395

Lacquers in packaging 399

Cautions in applying lacquers 401

Plastic and resinous coatings 402

Applying thermoplastic coatings 404

What to expect from coatings

by S. G. Stearns

With the postwar period looming on the horizon, prognostication is a favorite pastime these days. Rather than day-dreaming on our expectations concerning protective coatings, it is the intent of the following paragraphs to sketch a picture of the rise and development of the protective coating, and to demonstrate that the future of protective coatings is being determined by present trends.

Protective coating, through the use of naturally occurring resins, has existed as an art for centuries. In fact, we are told by historians that 2500 years ago the Egyptians employed oleoresinous varnishes for the rather dubious pleasure of protectively coating mummy cases.

Although the development and use of protective coatings has progressed as an art over the centuries, very little was known about the composition of the coatings employed, the mechanism of their formation, or the manner of evaluating their properties. Although it can hardly be said that protective coating formulas of several centuries ago were thrown together with the wild abandon of an alchemical brew, formulas of this period were subject to the limitations of the natural products available. Those analytical methods which were in existence were of more interest to the chemist than they were of use to the industry. As one writer of this period blithefully puts it, "The ingenuity of the manufacturer has been able to keep ahead of the skill of the analyst."

The development picture was brightened from time to time by the introduction of new resins, new drying oils, and new techniques, but progress was not startling as is evidenced by the fact that a classical book on coatings remained substantially unrevised for 200 years.

With the coming of the first synthetics, as typified by the phenolic and modified phenolic resins, however, all this was changed. Here at last was a material of known composition and superior properties of chemical resistance and water resistance. This development of the first commercial synthetic was followed by a long list of polymers and elastomers which by virtue of such accentuated properties as solvent resistance, flexibility, and weather resistance, have added new life to the entire field of protective coating.

Concurrent with the development of the synthetics was the "rise of the scientific method." Under the tutelage of the chemist, the art of protective coating has been raised nearly to the level of a science. This development of the scientific method has taken two courses. First, there has arisen a more profound knowledge of the properties of coating materials, protective and otherwise. The present-day user of coating materials is interested in such aspects as, odor, toxicity, moisture-vapor transfer, flexibility, chemical resistance, and a host of other properties. This extension of requirements which a coating material is called upon to meet, has forced the development of tests to evaluate these properties. The prospective user of coating materials can now, after a careful analysis of his packaging problem, select the protective coating which will most nearly approximate his requirements.

The second branch into which this scientific thinking has been directed is toward the development of the coatings themselves. The chemist has been able to determine the influence of chemical structure on the physical properties of the coating material. Armed with this knowledge, he can be guided in his work of creating new synthetics as well as in the modification of existing ones.

The modern chemist as compared with the early investigators knows that the water sorption of shellac, as an example of a natural product, is due to the presence of an arrangement of atoms called a hydroxyl group. In a synthetic material such as polyvinyl alcohol, the presence of these same hydroxyl groups is conducive to the same

1—Stepladder and spray gun are the only equipment required for this effective kind of packaging of aircraft. Photo, Dade Brothers, Inc.

1



2—Coatings which can be quickly stripped now perform military services, will find their counterparts postwar. Photo, Dade Brothers, Inc.

2



property unless they are removed, as for example by the formation of polyvinyl chloride.

As an example of how synthetics with properties which render them unusable can be modified to secure the desired properties, let us examine polyvinyl chloride vs. polyvinyl acetate. Polyvinyl chloride is hard, tough, and difficultly soluble in organic solvents. Polyvinyl acetate is a soft, flexible material which is soluble in a wide range of solvents. The union of polyvinyl chloride and polyvinyl acetate results in a material which in its properties is intermediate between the two components.

Another factor which is having and will continue to have an important influence on the development and usage of protective coatings is a greater understanding of the mechanism of the transfer of water vapor and gases through protective films and coatings. Not only are studies in this direction indicating that films exhibit a wide range of behaviors and transmissions depending on the ambient conditions, but in many cases, notable among which is polyvinyl alcohol, preferential transmission of some gases occurs to the exclusion of others. Studies of this type are valuable to the producer and consumer of protective coatings alike, in that they indicate the threshold thickness of coatings which must be employed to secure optimum protection against the transfer of water vapor and gases. This effect of preferential transfer can likewise be utilized where the coating material is impermeable to those gases which are harmful to the product and permeable to inert gases or to those gases which aid in maintaining the quality of the product.

An example of this is the use of rubber hydrochloride in coffee bag stock in order to secure high impermeability to oxygen which causes rancidity, while at the same time securing permeability to atmospheric carbon dioxide.

Although a greater understanding of the basic theory underlying the creation and properties of films is vital to the development and correct usage of films the most rapid advances will undoubtedly be made through the discovery of new synthetics. Research has enabled us to evaluate coatings and determine their shortcomings, but as was the case with the naturally occurring films, intermarriage of various existing materials is not the final answer to the problem of creating a coating with outstanding general properties; the answer lies in the creation of new synthetics which will amplify the desirable characteristics and eliminate the undesirable.

This trend towards new synthetics with outstanding properties is already in progress. The cry for improved solvent resistance and superior moisture-vapor transfer characteristics is being answered by materials such as polyvinylidene chloride (saran). In addition, other new materials such as polythene with improved acid resistance and silicones with high temperature resistance are already taking their place.



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5 ↓



3 & 4—Lacquer coatings on labels of these fibre-bodied, metal-end cans add moisture-and-gas retention properties, impart glossy surface which resists soil. Photo, Merck & Co. 5—Inside-coated 5-gal. fibre drum with wooden plug top used for lubricating greases. Paper liner and metal ring effect seal. Photo, Philadelphia Carpenter Container Co., Inc.

Technical aspects of resinous coatings

by Robert Gordon

Resins have made it possible to build airplanes and gliders without metal, raincoats without rubber, shoes without leather, fabrics without cotton, windows without glass and to obtain direct substitutes for many materials, which were strategically needed for the war effort but too low in supply to meet the increased demand. For these reasons, most of the resins and film-forming materials mentioned in this article have long since been on high priority. However, when war needs are satisfied, these plastics materials will be back, many of them in improved form, doing their civilian jobs. Without the prewar development of resins and without our ingenuity in substituting and developing the uses for these materials, we surely would have been in a position which is commonly known as "behind the eight-ball," with respect to necessary war materials especially after our losses in the Pacific and the Far East. It is little wonder, therefore, that these materials were, for all practical purposes, cut short for civilian use. Most of the resins have been placed under strict allocation by the WPB. Restrictions have not only been caused by war demand for the finished resins, but also because of the limited amounts of raw materials necessary to manufacture them.

The shortage of acetic anhydride, for example, has curtailed the production of cellulose acetate; the scarcity of nitric acid has reduced the production of nitrocellulose; the output of the vinyl-type resins has been hampered by the shortage of the monomers; that of phenol-formaldehyde resins by shortages of phenol, cresols and cresylic acid; while production of modified isomerized and chlorinated rubber was restricted by lack of rubber.

The greatest blow to packaging came when metals were restricted for use in cans and collapsible tubes. Almost every marketable item was hit between the eyes. At first, the industry floundered desperately, but it finally rallied and turned more and more to using glass and paper coated with protective materials in place of tin cans. Sealing, moisture-vapor transmission, water and oil resistance were the big headache with paper, but these difficulties were overcome to a great extent by whatever resins were available and by the less strategic waxes.

Conversion difficulties

The conversion from metal to glass and paper would not have been so difficult in itself had enough equipment and sufficient resins been available to make the change. Packing in glass was not new by any means. Paper containers for liquids had been in development at least five years before the war started, and the biggest commercial use for such a container was for milk. Paper oil containers, too, have been seen on the market in prewar days, but tin was doing such a good job that there was no need for a change. The war made the change necessary.

As mentioned above, many of the organic solvent-soluble resins and film-forming materials are no longer available for civilian packages. However, some water-soluble materials, such as glues, casein, alginates, silicates, polyvinyl alcohols and methyl celluloses are, for the most part, available and can be readily employed in treating paperboard for oil resistance. Such materials must subsequently be protected from water and moisture by means of a varnish or wax.

As for the collapsible tube, regenerated cellulose and cellulose acetate came to the rescue of metals. Although these materials were easily converted for use as tubes, protection by means of some type of coating against moisture and oil had to be applied to them in order to make them as practical and as resistant as the metals. Resins and waxes again played an important part in providing the essential resistance necessary in the tube.

One interesting innovation in packaging liquids and other materials—a true "war baby"— is a fabric liquid container, developed by Standard Brands, Inc., which won an award in the twelfth All-America Packaging Competition. It is made of fabric, coated with a heat-sealing and resistant material. The seams are made by heat sealing and the bag is packed in an ordinary corrugated container. This package has shown exceptional possibilities.

Trends in coating

To understand coating materials, it may be interesting to trace their beginnings briefly. The word "lacquer" is derived from the Hindustani "lakh," meaning 100,000. It was originally given because of the thousands of insects whose resinous secretion was and still is the basis of many shellacs and natural gums.

Applying a protective or ornamental lacquer finish to wood, paper, metal or fibre is not new. It has been an art for centuries in China.

Whether a protective coating is classified as a varnish or a lacquer depends upon its method of drying. A lacquer dries purely from the evaporation of volatile solvent from the solution. A varnish dries chiefly by a chemical reaction known as oxidation.

Spirit varnish, therefore, really can be classified as a lacquer, but it is more like the lacquers used centuries ago than those classified as lacquers today. The latter are for the most part solutions of various gums and resins in alcohol.

The value of these spirit varnishes is due chiefly to their quick-drying qualities and low cost. In most instances, where only a limited amount of protection is desired, these spirit varnishes are adequate. However, they have indubitable faults, such as a tendency to soften in warm weather and to crack in cold. Resistance to abrasion is another quality usually sadly lacking in these varnishes.

Thus, it is not surprising that developments of new synthetic materials, such as rubber derivatives, vinyl and

methacrylate resins, and cellulose derivatives are looked upon by the packaging industry with keen interest. In these new materials are new ideas and trends, new style, new methods, new beauty and new protection previously unknown. Applications of overprints are no longer being made merely for the sake of enhancing the appearance of a package or wrap, but also to incorporate such protections as resistance to oils, moisture, acids, alkalies and the elements. In almost all cases, the new materials give a good-looking finish, so that their effect on appearance is taken for granted and is subordinated to their more protective properties.

Today many liquids and oils are being packed in paper containers. Many industries are effecting economies by the use of coated papers. Coatings have been used to protect whiskey labels from the effect of alcohol; soap wraps from discoloration and fading due to alkalies; oil labels from being stained by the oil; salt and cocoa from becoming caked by moisture in their containers.

Advantages of the new synthetics

One distinctive advantage of these new synthetic resin materials is their ability to seal with the aid of heat and pressure. Speed in production is increased greatly since the seal sets as soon as the temperature at which the seal was made drops a few degrees. Their bonds are stronger, more flexible, waterproof and do not deteriorate with age.

These rapid strides in the development of the new resins and their uses in packaging have been brought about by carefully planned and directed research. Traditional methods are becoming "has beens." Wide—awake and alert companies which desire to keep up with these modern trends cannot afford to overlook the new possibilities which these materials offer to industry. A brief résumé of the materials, the methods by which they are manufactured, and their packaging uses is given below.

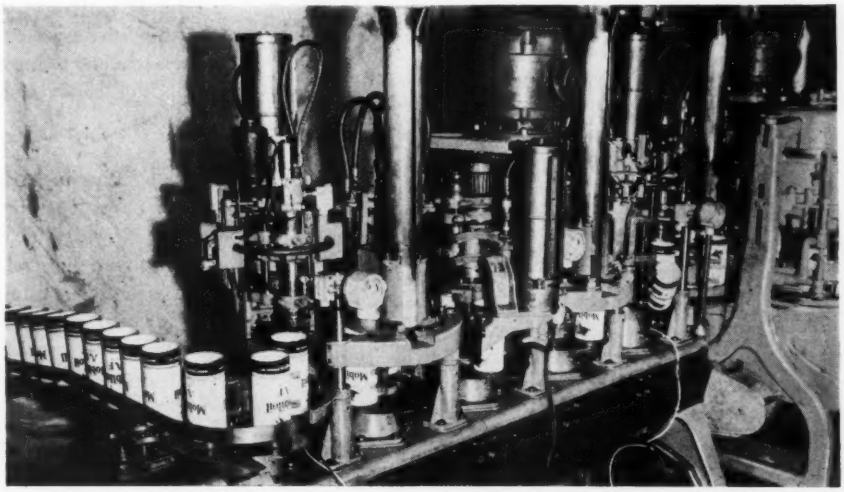
Rubber derivatives

Rubber in one form or another has always been used for water- and vaporproofing. However, its high viscosity, residual tack, lack of transparency and its general difficulty in handling have made it practically useless as a protective coating for paper. Modern research has developed from a very high grade of rubber a resin which can be handled very much like any other coating solution adaptable for application to paper. Moreover, this resin, which is a cyclicized derivative of rubber, is an improvement over the raw rubber in water- and vaporproofness. It is soluble in a variety of aromatic and aliphatic hydrocarbons and leaves a clear, glossy, transparent, heat-sealing film highly resistant to moisture, acids, alkalies and alcohol. It contains no chlorine.

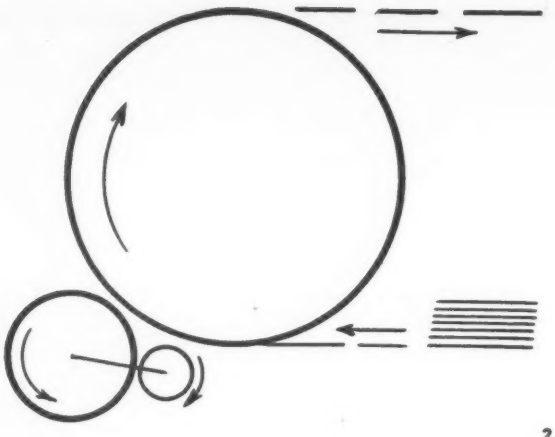
Another rubber derivative very suitable for use as a paper coating is a product known as chlorinated rubber or rubber chloride. It results from the reaction of chlorine on rubber in which the chlorine content may vary between 61.5—68 per cent. The theoretical calculation of the chlorine content is generally higher than the practical since crude rubber is made up of a soluble portion which is very reactive and a gel which is much less reactive.

Both the above-mentioned rubber derivatives are extremely useful as protective coatings where good resistance to moisture penetration, acids and alkalies is desired. They can be formulated to produce good, flexible films with excellent gloss retention. The cyclicized rubber derivative, however, is more suitable for heat-sealing purposes, since it is more stable to heat than the rubber chloride and is produced in various grades with various melting points. Both of these materials are unaffected by alcohols, but are attacked by gasoline. Their use on glassine or other hard-surfaced papers has given results which make these coatings extremely useful in packaging where high moisture resistance is required. On glassine paper, the cyclicized rubber derivative is used with as little as 1½ lb. per 3,000 sq. ft. of solid coating on each side of the paper to give moisture-vapor transfer rates of 1—5 grams of water per square meter per 24 hr. at a relative humidity differential of 100 to 0 per cent, compared with the uncoated paper, which has a moisture-vapor transfer rate of over 1,000 grams per square meter under the same conditions. This same cyclicized rubber derivative is also used on kraft paper to give a high strength sheet which is very resistant to the passage of moisture. This sheet has a high finish, is heat-sealable,

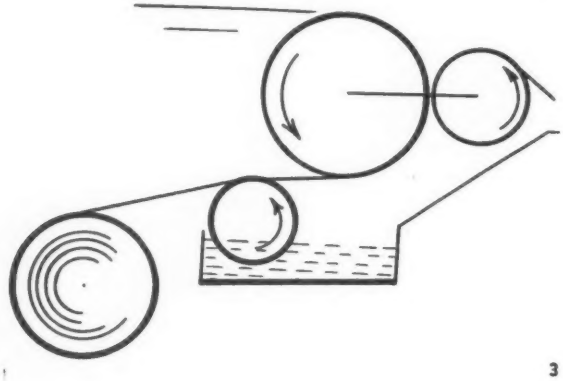
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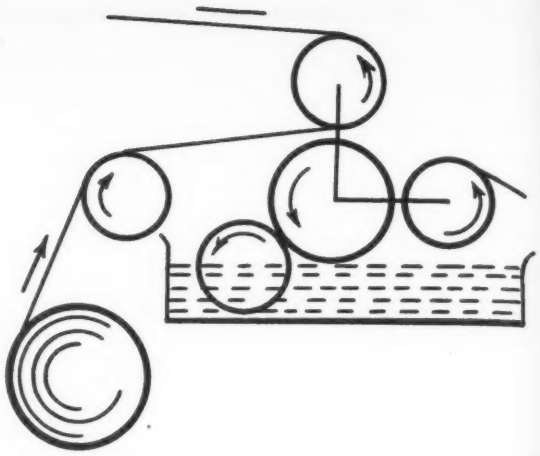
1—Wartime developments in coatings have made new packages possible, and new machines have been designed to handle them. This equipment, which forms an oil container of a grease-proof-coated paper, takes prelabeled, spiral-wound tube, seals in a newsboard bottom and up-ends container. Photo, Package Machinery Co.



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2—Diagram showing the principle of the varnishing machine which is commonly employed for coating sheets of material. 3—The reverse-roller coater applies coatings accurately and uniformly to web or roll rather than to sheet materials. The roller is half submerged in a tank filled with lacquer. 4—In another type of reverse-roller coater, the roller, which is operating in a lacquer bath, is attached to the distributor.

and offers many opportunities for using high strength paper in the field of large commodity bag packaging.

Uses of rubber derivatives

The outstanding advantage of these coatings is that they are non-toxic and usable for food packaging where high moisture resistance is required to prevent caking of such items as salt and cocoa or to prevent staleness of biscuits, corn flakes, potato chips, pop corn, etc.

The chemical resistance of these rubber derivatives allows for wrapping and packaging of such materials as soaps and detergents and prevents discoloration of the wrap by the alkalies.

Vinyl polymers

Vinyl chloride and vinyl acetate are formed by passing acetylene through hydrochloric acid and acetic acid, respectively. The molecules of these compounds are characterized by the possibility of joining together with other like molecules to form larger molecules possessing the same empirical composition. Thus, when vinyl chloride and vinyl acetate are each treated with catalysts, they are polymerized to form polyvinyl chloride and polyvinyl acetate, respectively. This chain reaction can be controlled to various degrees of polymerization and the degree of polymerization determines the average molecular weight, as well as some of the more important properties of the polymer.

Polyvinyl chloride is high in tensile strength, has good chemical and water resistance. However, it has poor solubility in most organic solvents and is, therefore, limited in its use for a surface coating.

Polyvinyl acetate, on the other hand, has properties which are quite different. Its softening point is as low as 30° C. and it has a high water absorption and tacky nature. It is more useful, consequently, as an adhesive rather than a surface coating.

A joint polymerization of these two compounds simultaneously, however, with a content of about 85—87 per cent vinyl chloride, yields a product which is soluble in many organic solvents suitable for use as mediums for adapting the resin for surface coating. What actually happens is that the vinyl acetate, when polymerized together with the vinyl chloride, internally plasticizes the polyvinyl chloride while retaining most of the properties of the polyvinyl chloride.[1]

A large variety of compounds can be made with varying properties by the copolymerization of these two materials, by controlling the average molecular weights and by altering the vinyl chloride to vinyl acetate ratio.

Uses of the vinyl resins

Vinyl resins of this nature find their most extensive uses in paper coatings where good resistance to acids, alkalies, oils, gasoline and alcohol is required. They have already found successful application in paper liners for bottle caps, fibre containers for holding oils, fibre cartons used for packing nitrocellulose which is kept wet with denatured ethyl alcohol, labels and box papers for improving the appearance as well as for resistance to the above-mentioned materials.

[1] These copolymers of vinyl acetate and vinyl chloride are manufactured and sold under the name of "Vinylite."

Vinyl resins in general have excellent heat-sealing properties, water resistance, are non-toxic, odorless, tasteless and practically water-white. This makes them ideal for use in food containers and wrappings. They have been used for packaging dairy products, such as butter and cheese, and they have also been used on the hoods for milk bottles.

The vinyl acetate polymers have extremely high thermo- and cold-adhesive qualities, and are quite extensively used as adhesives in the packaging field. They, too, are non-toxic, odorless, tasteless and colorless, but the water absorption is rather high. However, water does not dissolve polymerized vinyl acetate. This type of resin is used for sealing paper milk containers, paper drinking cups for both hot and cold liquids, as well as a seal for cellophane and cellulose acetate film. It can be coated by the regular methods and makes fine heat-sealing papers.

Methacrylate resins

The methacrylate resins also belong to the vinyl group, chemically speaking, and are made basically from coal, air, water and petroleum. These resins are made from various esters such as ethyl, methyl, butyl and isobutyl derivatives.

To date, the most extensive use for acrylic resins has been in molding. However, they are soluble in a large variety of solvents and are suitable for coating. The ethyl methacrylate, however, is probably the best suited for this work, since the methyl polymers which are used chiefly in plastics are too hard and brittle for coating. The butyl polymers, moreover, are too soft and sticky for such applications.

The acrylic resins are water-white, thermoplastic and have good resistance to water and inorganic chemicals. They have not been fully explored as yet in this particular field, inasmuch as they have been very costly.

Polystyrene resins

Polystyrene resin, also known as vinyl benzene, has ideal potential properties for protective coatings. However, their one drawback is their hardness and lack of flexibility. Formulating chemists have for the past few years been hard at work improving some of the properties of styrene.

Cellulose derivatives

Nitrocellulose, ethyl cellulose and cellulose acetate have also been used to a great extent for coatings for paper. However, their usefulness is much more limited than the other thermoplastic, high molecular weight, film-forming resins mentioned. Good moisture-resistant nitrocellulose lacquers and fair oilproof cellulose acetate, as well as good thermoplastic coating from ethyl cellulose, have been made. However, these materials do not have as many inherent physical and chemical properties as do the thermoplastic resins. They have to be modified in so large a measure by other ingredients that, in many cases, they lose their advantages. In paper work, these materials have found large uses in coated labels and fancy box papers. Moistureproof nitrocellulose lacquers have been used on both cellophane and glassine with good results. The one outstanding disadvantage of nitrocellulose lacquers is their high rate of inflammability. This requires extreme care in handling and storing.

General characteristics of resinous coatings

In general, all coatings mentioned give good scuff-proofness and good gloss, which enhance the appearance and serviceability of the package.

The thermoplastic type of material is best suited for heat-sealing, and bags can be made and sealed only with heat and pressure. In general, temperatures of approximately 300—400° F. are required.

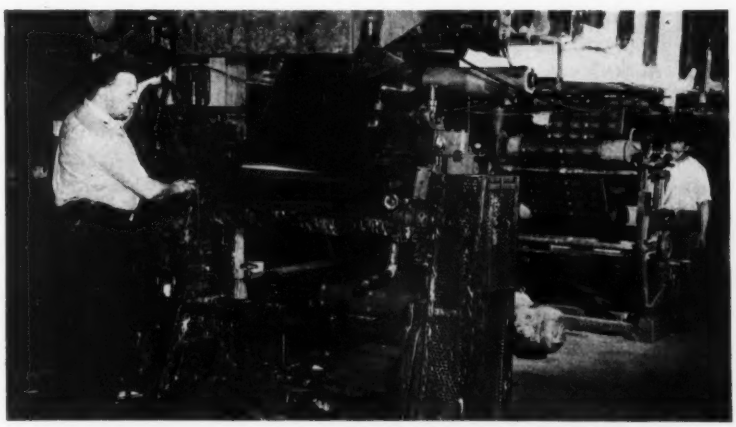
The above statements are all relative and general. The efficiency and advantage of any of the materials mentioned will depend upon the precise development by the lacquer manufacturers of these materials for particular packaging uses.

In application, the lacquers made from these new synthetic bases vary little from the conventional methods of coating. However, certain facts must be taken into consideration if the best protection and appearance are to be obtained. First, let us consider briefly some of the established methods of application, their shortcomings and the modern trend to improve these methods.

Varnishing machines

Coating in sheets is generally accomplished on a so-called varnishing machine, which consists of a reservoir

5



5—Application of heat-sealing thermoplastic coating to a laminated war packaging material which is made of foil and cellophane. Machine in the foreground coats the continuous sheet of laminate which then enters the drying tunnel above and, after drying is rolled up. Photo, Reynolds Metals Co., Inc.

TABLE I.—GENERAL RESISTANCE

	Cyclicized Rubber	*Chlorinated Rubber*	*Vinyl Copolymer*	*Polyvinyl Acetate*	*Acrylic Resins*	*Nitro Cellulose*	*Cellulose Acetate*	*Ethyl Cellulose*
Acids Weak	excellent	excellent	excellent	good	good	fair	fair	fair
Acids Strong	excellent	excellent	excellent	good	good	poor	poor	poor
Alkalies Weak	excellent	excellent	excellent	good	good	poor	poor	excellent
Alkalies Strong	excellent	excellent	excellent	good	good	poor	poor	excellent
Salt Spray	good	good	excellent	good	fair	poor	poor	fair
Alcohol	excellent	good	excellent	poor	poor	poor	poor	poor
Gasoline	poor	good	excellent	good	fair	good	good	poor
Mineral Oil	poor	good	excellent	good	fair	fair	good	fair
Vegetable Oil	poor	poor	excellent	good	fair	poor	good	poor
Animal Oil	poor	poor	excellent	good	fair	fair	good	poor
Essential Oil	poor	poor	poor	poor	poor	poor	good	poor

in which the liquid is poured. Running in this reservoir is a distributing roller with an attached doctor roller, which regulates the amount of coating to be applied to the sheet. The sheet is drawn over the distributing roller by means of a large revolving drum equipped with grippers. These grippers hold the sheets firmly to the drum as it revolves. At the same time, they draw the paper over the distributing roller with the regulated amount of coating. The sheet picks up the coating, is then released on an endless belt and carried through a heated oven to be dried.

Although this type of equipment has served the industry successfully for years in applying spirit varnishes which are used chiefly for good appearance, a little more careful handling and thought to details must be given if this method is to be used successfully for applying protective coatings. Like the chain with its weakest link, the protective quality of the finished product is only as good as the continuity of its film. Pinholes, bare spots and not enough coating render the sheet useless.

The machines have been modified to the extent of varying the speeds of the distributing roller, so that the sheet wipes against the roller instead of kissing it.

The modification tends to eliminate any streaks in the coating and to provide for more uniformity and a wider range of thickness control. Another modification has been to reverse the distribution roller in such manner that it runs in the opposite direction to the motion of the large drum and the sheet and thus lays down a smooth streakless coat. This is, perhaps, the best method. However, since the operating details have not as yet been satisfactorily worked out, more information is not available.

Reverse-roller equipment

The second method to be discussed is the reverse-roller coating equipment, of which there are several different types for production in the web or roll, rather than sheet. At present, there is no question about the merits of this type equipment. With these machines, accuracy and uniformity can be obtained satisfactorily without too much difficulty.

One reverse roller type of machine consists essentially of a roller about half submerged and operating in a tank filled with lacquer. The paper runs over this roller in the opposite direction to its motion, picks up the lacquer and is carried between two rollers attached in wringer fashion. One of the rollers is stationary and revolves in the direction of the paper. The other roller is adjustable and operates in reverse direction to the movement of the paper. To the adjustable roller is attached a doctor blade which wipes down the excess lacquer which is picked up from the paper. Very accurate results for the weight of coating can be obtained from a machine of this type. In fact, actual calculations of the amount of coating to be applied can be determined before operation starts.

Another popular type of reverse-roller coater has a roller operating in a lacquer bath. To this roller is attached a distributing roller, which picks off the lacquer from the roller in the bath. To the distributing roller are connected two adjustable auxiliary rollers at approximately 90° from one another. One of these auxiliary rollers has a doctor blade attached to it, operates in reverse of the distributing roller and regulates the amount of lacquer on the distributing roller. Between the second auxiliary roller and the doctored-off portion of the distributing roller, the paper passes also in a direction opposite to the rotation of the distributing roller.

Rotogravure

Rotogravure printing is also being used to apply lacquers to paper in web form. Recently presses have been designed with closed fountains, which are ideal for lacquer work. However, rotogravure applications of lacquer for protective work have limitations: first, in the amount of coating applied and, second, in the continuity of the film. The lacquer is applied by means of etched rollers. The formulation of the lacquer must be such that it forms a uniform film before drying.

Baking

After the lacquer is applied, the sheets or web pass through a heated oven. These ovens are generally 30—40 ft. long and are constructed of sheet iron lined with asbestos. The source of heat is either the open gas flame, steam coils, hot air or, more recently, infra-red lamps. Of all these, the open gas flame is the least desirable, since it affords a definite fire hazard when used with lacquers.

Although many of the lacquer bases are non-inflammable, the solvents used in them will flash at relatively low temperatures. The other types of heat are safe and, with such other necessary precautions as adequate ventilation, static control and proper electric equipment, little if any danger is to be feared from the fire hazard.

One development in designing ovens has come about by the use of synthetic coating materials. It has been found that thermoplastic compounds will flow out when sufficient heat is applied to make them melt. Since the heat required to bring about this change of state is generally high enough to scorch the paper, the heat is applied only for an interval of 5—10 seconds, depending upon the amount of heat used. In most cases, about 400° F. is used for 5—10 seconds after the heated sheet has passed through the regular oven at 150—200° F. The result of this flash bake is a beautiful, smooth, high-gloss finish.

With infra-red lamps, no ovens are required, since the air is not used as a medium for conveying the heat energy. Infra-red lamps give off rays which are not absorbed by air. The efficiency of this method, however, depends on the material being heated. That is, if the material has the ability to reflect or transmit rather than to absorb these radiated rays, no amount of drying time will be adequate. However, if it does have the ability to absorb these rays, excellent drying facilities by this method can be arranged. Paper absorbs only a small amount of these rays, especially if the paper is white, and it is believed to be an impractical method of drying lacquers efficiently on paper.

Selection of paper

The selection of the proper grade of paper is of vital importance to obtain maximum results. A grade of paper not suited for lacquering is extremely costly and the results are inadequate. Too much emphasis cannot be placed on the selection of paper stock. In considering paper for a protective lacquer, it must be remembered that it is only the film formed above the fibres that gives the most effective protection. Consequently, it goes without saying that papers which allow the least amount of coating to penetrate into the surface of the sheet are best.

A convincing illustration of this fact was demonstrated in work with moistureproof lacquers. In an application of approximately 1½ lb. of solids on each side of a glassine sheet over a 3,000-sq. ft. area, a series of readings revealed 0—5 grams of moisture-vapor transmission per 24 hr. per square meter. In an application of coating to a paper stock that was picked at random, but which was being used for lacquering, readings were 50—60 grams of moisture penetration. It wasn't until about 3—4 lb. of coating were applied to each side that favorable readings were obtained for the paper picked at random. Furthermore, an additional amount of coating on the glassine sheet gave no better results than the initial amount stated above. Thus, there is a limit to the amount of protection you can get and this maximum limit can be obtained much quicker and at a greater saving with the proper paper. It is much cheaper to treat a paper properly in the mill for good lacquering results than to apply an excess of lacquer to make up for paper deficiency.

Paper to be used for lacquering should have a hard surface free from pores, grooves and standing fibres. In most cases, a supercalendered sheet or a coated sheet produces the best results. The coated sheet is superior, however, to the supercalendered sheet, inasmuch as there is less penetration into the paper. However, great care must be used in the selection of a coated stock. The coating should be hard but flexible, since the lacquer film will crack if the paper coating cracks upon flexing.

In buying competitive lacquers the purchaser should obtain the following salient facts in order to evaluate them on a dollar-for-dollar basis:

1. Knowledge of what you want the lacquer to do
2. Weight per gallon
3. Percentage of solids per gallon
4. Specific gravity of solids or how far it will go per unit of thickness

Lacquers, in many cases, can be formulated to give you the best results for certain types of protection. It takes much less lacquer to do the best job, if you select one specifically designed. Knowing the weight per gallon, the percentage of solids and the specific gravity of the solids, you will be able to evaluate the cost of competitive lacquers—assuming, of course, that their properties are equally good.

TABLE II.—PHYSICAL PROPERTIES

	Cyclicized Rubber	*Chlorinated Rubber*	*Vinyl Copolymer*	*Polyvinyl Acetate*	*Acrylic Resins*	*Nitro Cellulose*	*Cellulose Acetate*	*Ethyl Cellulose*
Specific Gravity	1.07	1.57	1.35	1.20	1.18	1.65	1.27	1.14
Specific Volume, In.³/Lb.	26.0	16.98	20.6	24.2	23.3	16.26	20.2	23.91
Color	very light	light brown	water-white	water-white	water-white	very light	water-white	very light
Odor	none	none	none	none	none	none	none	none
Taste	none	none	none	none	none	none	none	none
Flammability	none	low	none	none	none	high	none	low
Heat Seal	excellent	poor at high temp.	excellent	excellent	excellent	fair	fair	good
Resistance to Aging	fair	fair	excellent	excellent	excellent	poor	excellent	excellent
Water Resistance	very good	very good	very good	poor	good	fair	poor	poor
Water-vapor Impermeability	excellent	excellent	good	poor	fair	good	poor	poor
Toxicity	none	none	none	none	none	none	none	none

XUM

Paper coatings

by John F. Halladay

Any coating for paper falls into one of two categories: first, decorative coatings; second, functional coatings.

Past experience has shown that interest in decorative coatings declines when the world is engaged in war and that the interest in functional coatings increases greatly. For this reason, recent developments in paper coatings for functional purposes are so many and so varied that it is almost impossible to cover these in limited space.

Functional coatings

By far the greater number of functional coatings recently developed aim at increased water resistance, increased water-vapor resistance, increased resistance to gas penetration, or increased resistance to the penetration of oils and fats. To accomplish the first of these, many adaptations of previously known principles have been developed for a specific purpose. The greater number of coatings developed to secure water resistance involve the use of thermoplastic materials such as asphalt, waxes, and synthetic resins. These are largely extensions of the well-known principles which have been used in peacetime for so many years in the manufacture of waxed glassine and cold waxed butter cartons. For the severe service expected of materials to be used in combat operations, any film of this nature must be reasonably continuous—that is, without pin holes or other uncovered portions. Cellulosic materials, because of their essentially porous nature, are not entirely compatible with this aim and many of the newer water-resistant sheets are given a preliminary treatment by conventional coating processes with materials resistant to the penetration of waxes and asphalt to impart to the cellulosic base an oil-resistant continuous film which will prevent irregular penetration of the water-resistant film. Most of these preliminary coatings consist of plasticized animal glue or similar materials, but the newer synthetic films, such as methyl cellulose, have also been used successfully for this purpose.

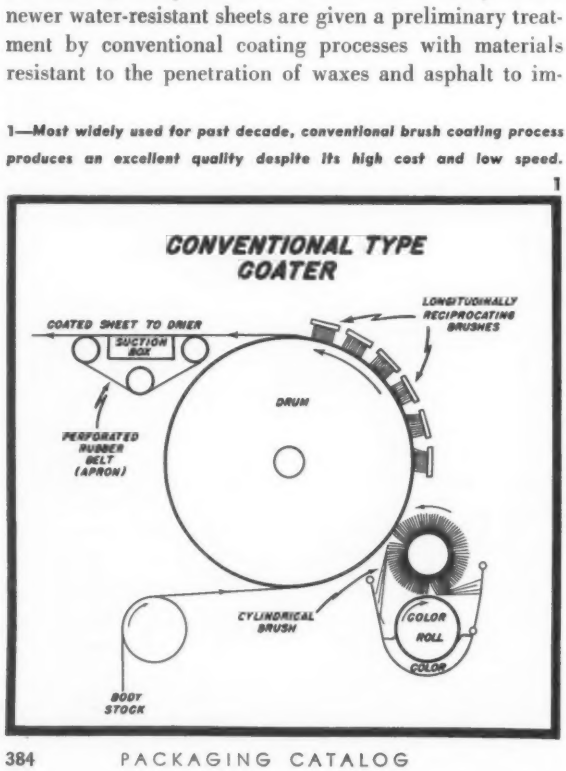
The same principles apply to the development of water-vapor-resistant coatings. In both of these functions the laminating of materials dissimilar to paper has been increasingly important. While these are not strictly paper coatings, aluminum foil, lead foils, certain types of cellophane and Pliofilm have been used and the successful lamination of these films to paper involves the same principles with respect to the supplementary coating to prevent penetration of the laminating material into the paper base. In fact, all of the functional coatings involve the basic principle of coating paper to permit the application of continuous films without excessive penetration of the coating or laminating material which has been selected for a specific end use.

Decorative coatings

Under the necessity of war, much has been learned with relation to the minimum tolerable specifications on the coated papers adapted to subsequent printing operations. Rulings of the War Production Board in reducing the basis weight of papers have forced many changes in the coated book paper field. One needs only to examine any of the numerous periodical publications to realize what sweeping changes in basis weights have resulted from these rulings. No one could deny that the quality of the

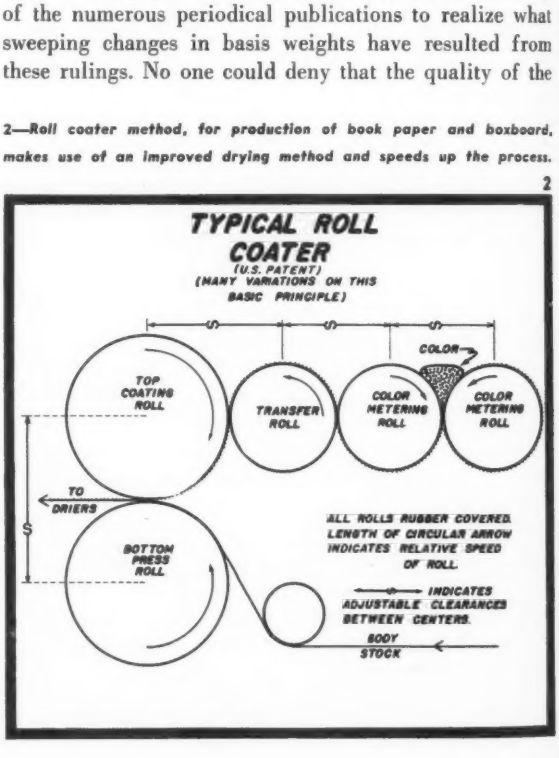
1—Most widely used for past decade, conventional brush coating process produces an excellent quality despite its high cost and low speed.

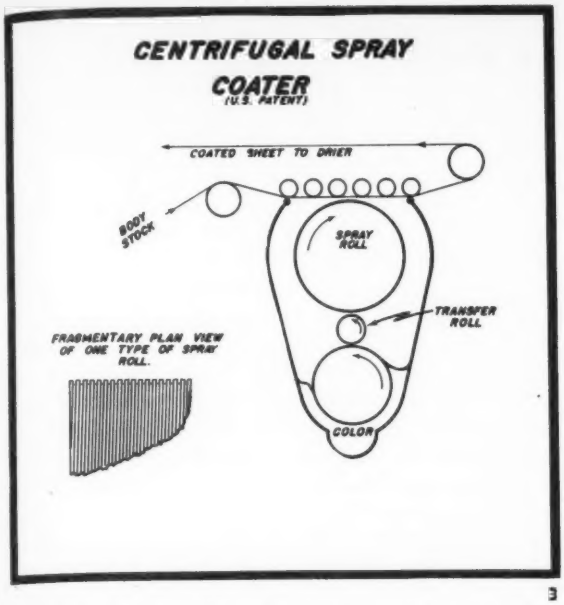
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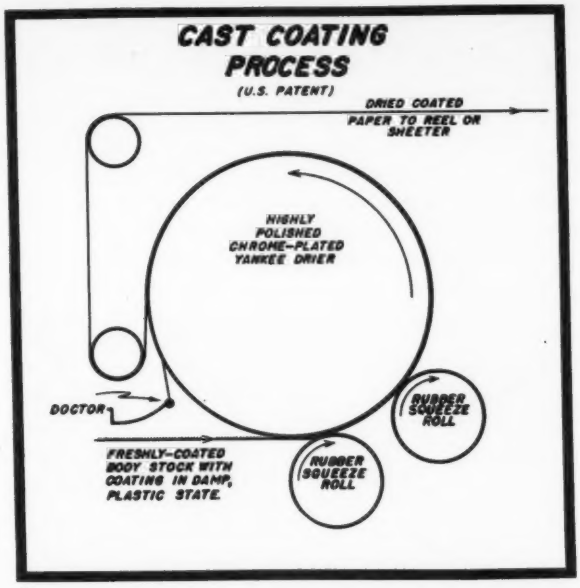
2—Roll coater method, for production of book paper and boxboard, makes use of an improved drying method and speeds up the process.

2

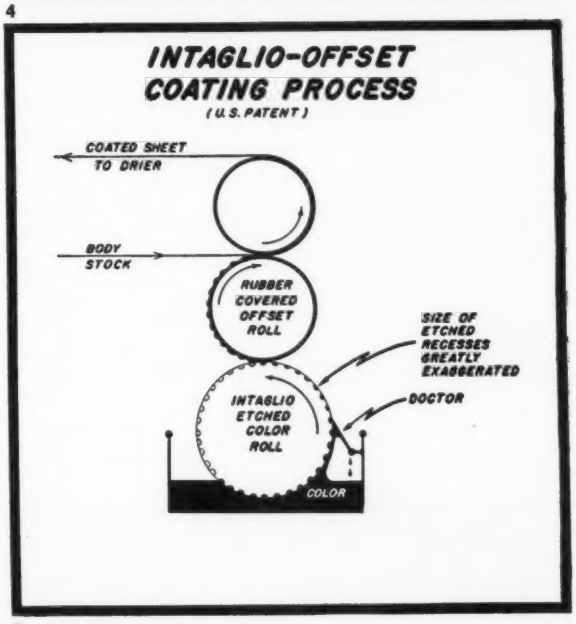




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4



5

3—Centrifugal spray coating method lays on a smooth, even surface, reducing striations to a minimum. Ordinarily used for coating one side only, the method is especially suitable for producing box cover paper. 4—The cast coating method, using a highly polished chrome-plated drier, produces an excellent surface for gloss ink printing and fine-screen halftones. 5—Thickness of the coating produced by the intaglio-offset method is controlled entirely by the depth of etch on the intaglio roll.

printed results in various magazines is far inferior to that prevailing before the war but, as a means of conveying information, it is undeniably true that the wartime magazines are adequate if not entirely satisfactory. For this reason, coated book paper manufacturers are becoming aware of the economic soundness of trimming the specifications of coated books to fit a particular need. Increasing thought is being given to the possibility of running coated book papers by other than the conventional means. This does not mean that the conventional brush method of coating paper will be supplanted or even curtailed greatly by new developments in decorative coatings for papers. Already it is possible to see that machine-coated papers are being applied in the book field where top quality printing is not entirely essential and it is believed that these possibilities will be more practically and intelligently utilized when economic considerations rather than wartime regulations govern the choice. Among the newer machine-coated book papers, those coated by the roll-coating process* are undoubtedly of the most sweeping commercial importance. Little poundage is being produced on the centrifugal spray coater* and this is also true of the intaglio-offset coating process.

Production of the cast coating process * is being marketed in increased quantities and this beautiful sheet of coated paper should be of increasing interest in connection with box cover papers and other uses involving the finest quality of merchandising packages. It should be realized, however, that paper produced by this method lends itself especially to gloss ink printing and is somewhat more difficult to print upon than some of the less costly, less smooth paper surfaces which have been coated by the other methods.

Partly due to the restrictions imposed by war and partly due to the economic conditions surrounding war, little actual change can be noted in the basic materials used for coating papers for decorative purposes. Most of the adaptations of new materials have been aimed at the production of sheets which, to the lay observer, appear much the same as they did in the period before war exigencies had to be met.

It is almost certain, however, that the development of new materials to be used in connection with the various coating processes will progress by leaps and bounds after peace has come.

* See **Modern Packaging** (Vol. XVII, No. 10) June 1944, p. 111

Coating impervious papers

by Robert Gordon

The increased demand for protective coatings for packaging materials has brought to the front definite problems which have always existed heretofore but to which not much detailed consideration was ever given.

In many cases the public demand for new developments has thrown the wheels of science into high gear—but often the wheels were forced back again into low or reverse by the slowness of the public to accept the very developments it originally demanded.

Since the forces of science have proved to be great, it stands to reason that such paradoxes, although retarding, cannot stop its progress completely. Many examples of such condition exist, and the backlog of technical information obtained through this research has been dormant only because the public was not ready for it. Now it has suddenly been removed from the shelves and developments which had been only in the laboratory stage until recently have now been put into practical use in packaging and in other fields.

For those who have been associated with packaging, it is not too difficult to recall the slow progress that protective coatings made in this particular field. In the following discussion we mean to point out some definite angles which must be taken into consideration before a good protective paper can be manufactured.

Let us view a horizontal sheet of paper with the top represented by line AB, and the bottom of the sheet represented by a line A′B′ as shown in position no. 1, Fig. 5. In this position, both lines are of equal length. When they are creased or folded sharply along a line equidistant from two ends, they will meet along a line 90° from their original position, as indicated by position no. 2, Fig. 1.

The line AB which may be considered as the coating, must increase in length in order to take up position no. 2 and becomes longer than the line A′B′ which may be considered as the paper, originally of the same length.

This change of length has a definite bearing on the imperviousness of the coating. In the first place the greatest amount of stretch takes place at the fold. As a consequence the protective film becomes thinner at the fold and will have a tendency to weaken there. If the coating is not elastic enough, it will not be able to withstand the stretch, and as a result it will break and allow penetration. If the side of the paper which is coated should break during the folding a greater degree of elasticity of the coating is required since now it has to stretch across the gap caused by the break in the stock also. The fragments of the paper breaking away from the body of the stock, exert a force against the coating which may be too great for the stretched portion of the film to withstand, causing ruptures along the fold line.

If we concern ourselves at this point only with the coating and forget the properties of the paper itself, we can show that the amount of coating in thickness applied, is an essential part of producing a good resistant paper.

1—This is a cylindrical container made entirely of paper with a heat-sealable lid which is warranted by the manufacturer to hold a vacuum. 2—This container can be made at high speed on paper milk-bottle machinery. 3—Paper box for petrolatum hair dressing made on standard machinery.

1 2 3



We can consider a coated stock as consisting of the following components (Fig. 6):

1. The area A which represents the coating
2. The line B, or the intermediate layer of coating
3. The area C which represents the paper

We can define the intermediate layer as that thickness of coating adjacent to the paper which must be applied before resistance to a flat coated sheet can be obtained. We define it as thickness rather than weight for the simple reason that the weight is secondary to the thickness in determining the qualities of the coating. As a good illustration, if we work with a paper which is absorbent, a substantial weight of the coating is absorbed before resistance starts, and if measured with a micrometer it will be seen that, regardless of the weight of coating absorbed, little or no resistance results until a definite thickness begins to register. This can be explained partially by the fact that the fibres themselves absorb the coating leaving little on the surface and the coating tends to flow away from the high areas, leaving them bare.

As the coating starts to cover the surface of the fibres and fills the low areas to the level of the high areas, resistance starts to take place. This can be called the limit of the intermediate layer and any thickness in coating above this layer will show sharp increases in resistant properties. However a point can be reached where any additional coating is of little value. This can best be illustrated by a general curve in which thickness of coating is plotted against resistance to penetration in seconds.

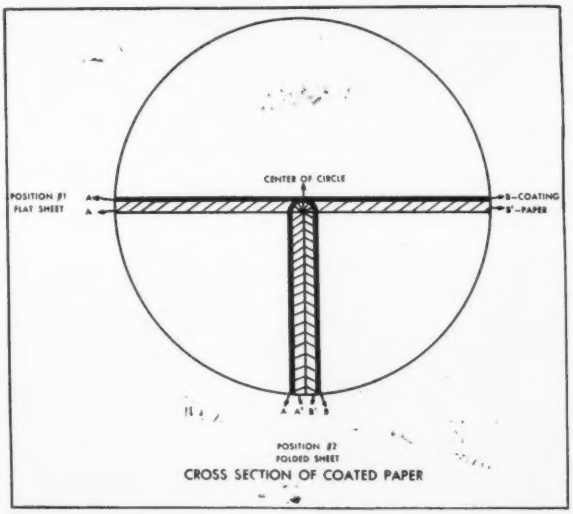
In a previous paragraph we pointed out what occurs to a film of coating on paper when it is stretched by a fold. We also want to point out that the elongation and the bursting strength of a film are functions of the thickness and that, therefore, thickness of a coating which is applied to the paper is a factor which must be considered, even though the elasticity of a film may be good. The film will tend to break at the point of the fold where the elongation is greatest, for at this point, due to the elongation, the film will be thinnest and the bursting strength will be less. As a result of the folding, the film will offer little resistance against breaking or puncture and it will rupture if it is not thick enough.

Because the thickness of the coating plays such an important part in obtaining the best results, any increase in thickness of a resistant coating to compensate for poor elongation and bursting strength may make such a coating prohibitive from an economic standpoint, unless other means are taken to keep the cost down. The coating in most cases is more expensive than the finishes applied to the paper by the mills. From a cost angle then, too much emphasis cannot be placed upon the necessity of obtaining a stock which has the essential requirement for coating. First, the paper must not be absorbent, for as pointed out, little benefit is gained from the coating which is absorbed by the fibres. Second, the coating should be flexible so that it does not break when folded causing the films to break because of the greater force exerted by the additional elongation required of the coating. Third, the stock should be so bound that fragments do not break away when folded, causing ruptures in the fibres. Last but not least, the paper should retain these properties over a long period of time and not be subjected to too great a change under different climatic conditions.

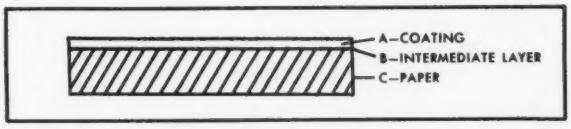
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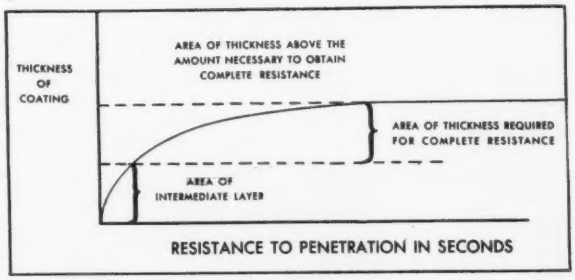
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7



4—New envelope container has plastic coating outside, heat-sealing, greaseproof coating inside. 5—Shows effect of folding on the coating. 6—The three components of coated stock are indicated by A, B and C. 7—Beyond certain limits coating loses its value. This is illustrated by curve of thickness vs. resistance to penetration in seconds.

Developments in waxes

Petroleum waxes are the backbone of waterproof and moistureproof papers. With few exceptions, they are among the best non-metallic materials known for resistance to transmission of water vapor.

They coat paper milk containers, butter cartons, bread wrappers. They protect cheeses, frozen foods, dehydrated foods, meats, crackers, tea, coffee, chewing gum, cigarettes and candy. They preserve a soldier's rations and keep his ammunition dry. They protect guns and machine parts from corrosion.

Attention is focused on waxes today because of their role in paper packaging taking the place of steel, tin foil and other materials now permitted only for the most essential uses.

The present use of waxes in packaging is the result of years of development that goes back as far as the first waxed papers used by National Biscuit Co. at the turn of the century for the inner wrap of their Uneeda Biscuit package which took crackers out of the cracker barrel and put them into individual consumer packs. It goes back to the early wax-dipped inner wrap for Cracker Jack. These same waxed packages with certain improvements are still used today.

To understand the use of wax treatment of paper, one must first know something about paper. Paper consists of countless cellulose fibres felted together and bonded by a sizing to make a continuous contact of cellulose to cellulose throughout the sheet, with minute openings between the fibres. Water (liquid) will pass through these interstices, rather than along the fibres. Moisture (water vapor) on the other hand, is transmitted by the cellulose fibres as well as through the interstices, since the cellulose fibres are hygroscopic and can actually remove moisture from the surrounding air.

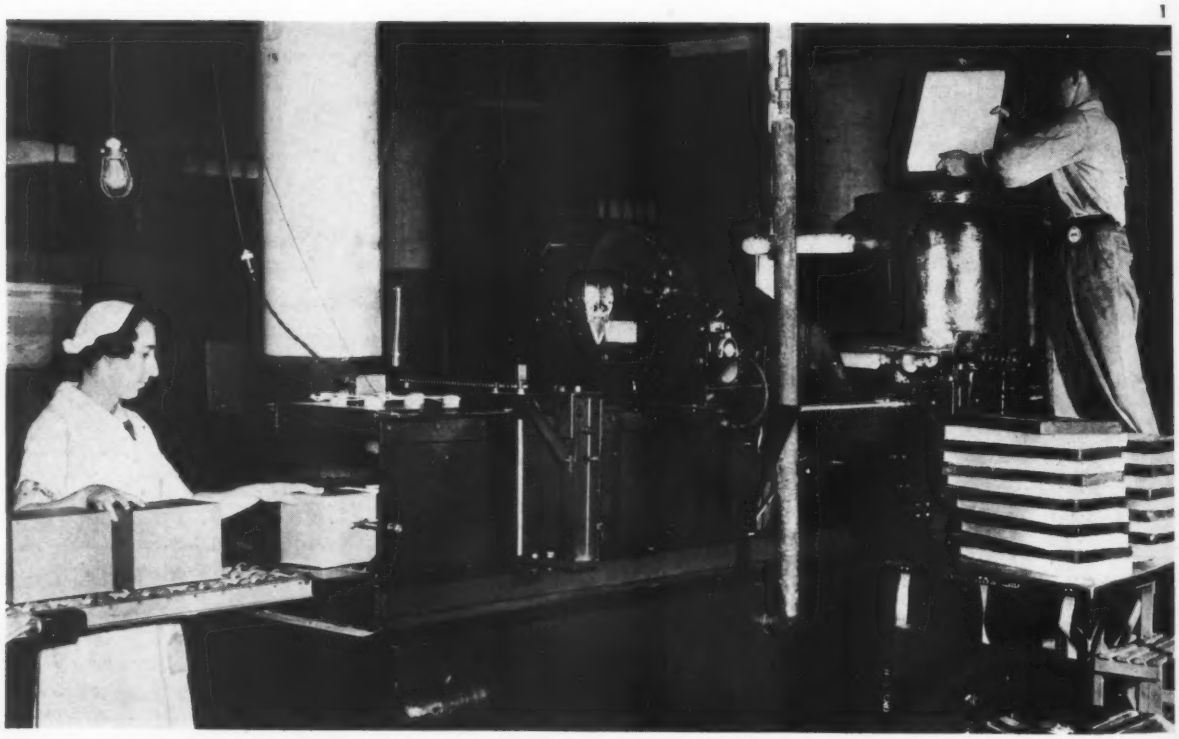
Paper may be made water tight by filling up the minute openings between the fibres with wax. This may be done in the paper industry by what is known as *dry-waxing*—driving the wax into the paper, with little, if any wax remaining as a surface film.

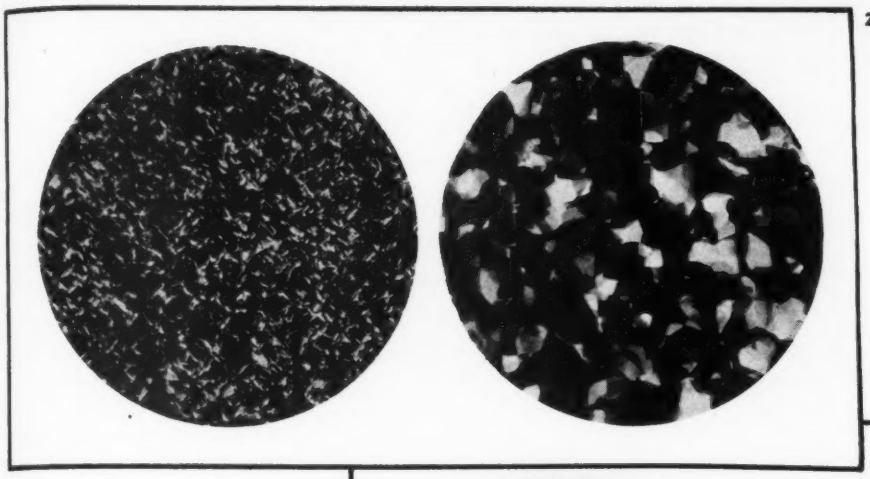
This method, however, though it fills the pin holes with wax, does not completely cover the cellulose fibres and many protrude above the surface like "fuzz" or wicks which absorb the moisture from the more humid side of the sheet and carry it along the chain of cellulose fibres to the dry side. Dry-waxing, therefore, is not capable of producing a completely moistureproof sheet. This can be done, however, by *wet-waxing*—or applying the wax as a surface film, with only enough wax impregnated into the paper to provide a bond to it.

A third method of imparting both waterproofness and moistureproofness to paper may be obtained by laminating two sheets of paper together with a layer of wax—

1—*Equipment for double-dip wax application at the American Chicle Co. First coat impregnates the container; the second gives a smooth surface.*

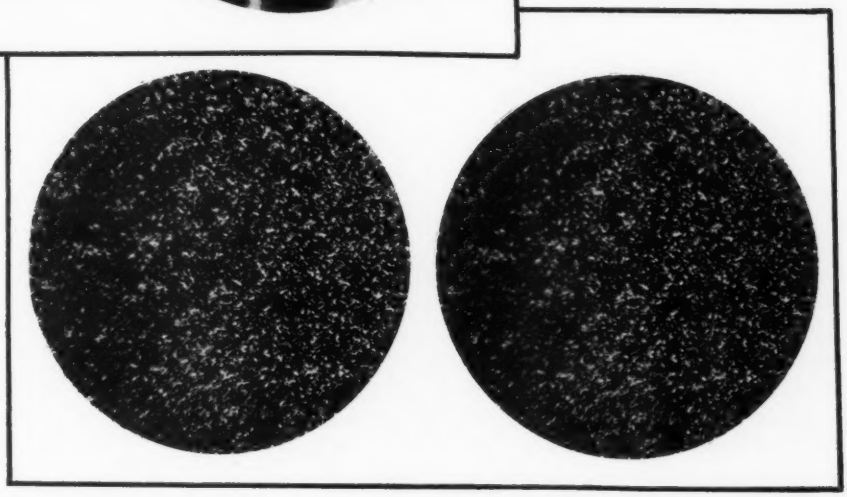
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2—Microphotos of paraffin wax. Left: before aging. Right: after aging. Notice the changes in crystallization. This characteristic renders paraffin wax unsuitable for a number of purposes which require stability.



3

3—Microcrystalline waxes, on the other hand, differ from the paraffin type in that they are relatively stable and show practically no change in crystallization before and after similar time tests.

this provides a continuous barrier protected from careless handling or abrasion by a durable ply on each side of the laminating barrier.

The wax film may be part of the carton structure as an outside or inside coating, or as a laminant. It may be used in a liner or as a wrapper. No fixed rules can be established for the type of package to be used for a specific application without careful study of the factors involved and a determination of the combinations best suited to each case. However, one objective must be maintained—a sturdy continuous wax film.

Types of petroleum waxes

Petroleum waxes used in the packaging industry are of two types—paraffin waxes and microcrystalline or amorphous waxes as they were called before their minute crystalline structure was known. While they are both composed of paraffinic hydrocarbons, they are quite different in their physical characteristics.

While both of these waxes are products of petroleum refining, their difference is due to the fact that they are separated from entirely different fractions of crude petroleum.

Paraffin wax is removed from distillates or overhead stocks by sweating or solvent separation. The microcrystalline grades are separated from residual stock by separating the petrolatum from these stocks by centrifuge or solvent separation and then further treating the petrolatum by selective solvent separation or by recentrifuging the petrolatum.

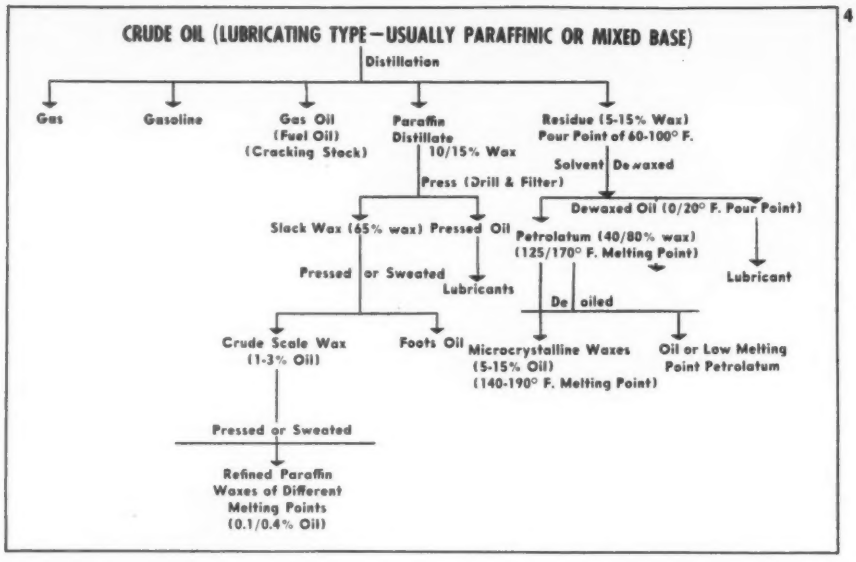
As microcrystalline waxes thus removed are dark in color, it is necessary in some cases to decolorize them in varying degrees to meet the requirements of specific uses. Very little difference is found in different shades of the same microcrystalline wax.

Paraffin waxes have lower boiling points than the microcrystalline waxes and are therefore lower in molecular weight, a fact which probably accounts for the melting point range of paraffin wax being lower than the melting point range of microcrystalline waxes.

Under ordinary circumstances it is found that paraffin wax melts between 100°—150° F. and has a refractive index of approximately 1.43 at 75° C.; microcrystalline waxes, on the other hand, vary in melting point between 140°—200° F. and have a refractive index of approximately 1.45 at 75° C.

There are, however, waxes of both types which do not fall within these limits due to novel methods of manufacture or to idiosyncracies of the crude oil from which these particular waxes are derived.

The different melting point grades of both petroleum waxes are made by adjustments in the manufacturing process and are also due to the nature of the crude oil which is being run. *(Continued on next page)*



4

4—Derivation of petroleum waxes is indicated on this simplified diagram. Notice the different processes by which the paraffin waxes and the microcrystalline waxes are obtained.

Important properties

The important properties of petroleum waxes are their high resistance to water-vapor transmission, their practical freedom from odor and taste, their change from solid to liquid state over a very small range of temperature, their relatively low viscosity in a liquid state immediately above their melting point and their chemical inertness. In addition to these properties common to both waxes, microcrystalline grades have excellent adhesive qualities, are quite flexible in thin films over a wide range of temperatures and are characterized by high melting points valuable for certain purposes.

On the flat sheet there is very little difference between the water-vapor transmission rates of paraffin and microcrystalline waxes, but the latter is said to be superior on a creased sheet or one that must stand crumpling or rough handling during its protection period. The property of microcrystalline wax is obviously due to its flexibility in thin films whereas the paraffin is quite brittle.

Commercial wax papers are being produced which have water-vapor transmission rates as low as 0.2 grams per 100 sq. in. per 24 hr. at a temperature of 100° F. and a relative humidity of 95 per cent on the wet side. Through further research and improved methods of application these rates are being continually reduced.

Adhesive properties or tackiness of microcrystalline waxes make them valuable as laminating agents when the adhesive layer also serves as a water-vapor barrier. Many of the ordnance wrapping materials now used employ this property of microcrystalline waxes.

Paraffin-type waxes and microscrystalline-types may be combined with one another in all proportions, so that compromises in the form of blends are possible. This is fortunate today, when Army Ordnance and the Quartermaster Corps are demanding the lion's share of microcrystalline for the laminations and wax dips used for packing ammunition, metal parts and rations. The Quartermaster Corps has been using a combination of paraffin and microcrystalline for the wax dipping of ration packages, but is at present making tests of new wax compounds with less microcrystalline and including paraffins mixed with synthetic thermoplastic compounds. Future progress will undoubtedly be made in this field. Microcrystallines have been advantageous for military packaging because of their higher melting points, and because of their greater ductility which prevents chipping at low temperatures.

Petroleum waxes in themselves do not provide greaseproofness. Greaseproof properties are a function of the sheet and not of the wax treatment. Glassines, parchments, cellophanes, for example, are greaseproof in themselves, before the application of wax and not because they are treated with wax.

"Blocking" is a term used by the paper converting trade to describe the condition wherein two waxed surfaces have flowed together to produce a union between them. Various degrees of blocking are experienced, from the incipient fusion in which only the surfaces are marred slightly, to the condition in which a cake or block of wax results. Blocking is caused by excessive temperature, time or pressure, either alone or in combination with one another. Blends of paraffin waxes and microcrystalline waxes, it is said, can be prepared which have no more blocking tendencies than fully refined wax.

Production and application of waxes

Total American production of paraffin-type waxes is between 350,000,000 and 400,000,000 lb. annually. Eighty per cent of this is used for packaging purposes. Microcrystalline production is about 100,000,000 lb. a year, a six-fold increase since the beginning of the war.

Wax may be applied to paper in the following ways:

1. As an emulsion in the beaters at the paper mill
2. As a coating to paper or paperboard, on one or both sides, by roller method
3. Immersion of entire paper sheet or board in a wax bath
4. Dacca Method. Cartons of properly selected stock may be glued on one end then immersed in a molten

wax compound which coats both inside and outside of the container. The container is then dried in a hot chamber to give a thin uniform coating and finally may be heat sealed

5. Single-dip Method. Sealed and filled carton is immersed in a molten bath. Extreme care must be taken to have container completely sealed before immersion, so that no wax flows into filled package
6. Application by flushing-type machines such as the "enrober" or some machines designed for the purpose of coating milk containers
7. Double-dip Method. Properly filled and sealed container is given a first dip to impregnate the board to a controlled distance, then is followed by a second dip to give a smooth, hard, continuous coating. Same compound is used for both dips, but is kept at a higher temperature for a shorter time during the first operation and at a lower temperature for the second dip. Machines for this operation are being widely used for wax dipping many types of rations and ordnance materials
8. Lamination of two films with a wax adhesive

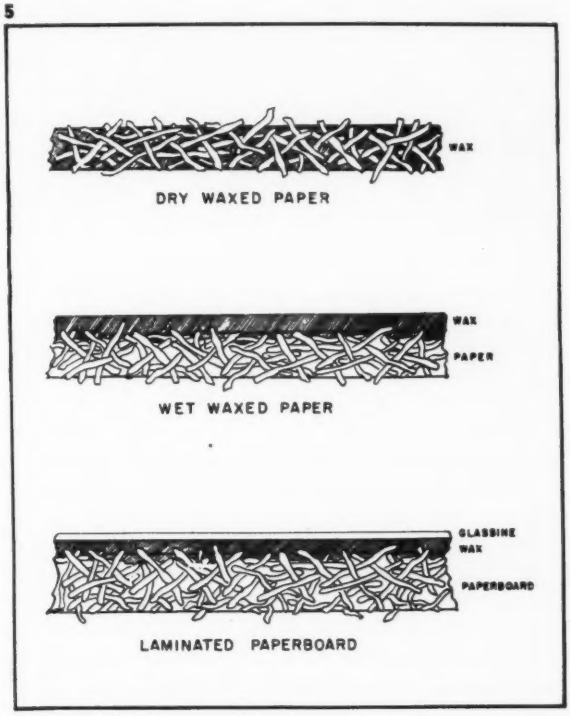
Uses of waxes

Paraffin waxes have been used for hundreds of purposes in the food field for many years. Among the important wartime developments have been the blends of microcrystalline-type waxes for dipping ration packages and for ordnance wrapping of metal replacement parts to prevent development of corrosion.

The double-wax dip method used so widely for Ration K is also adopted for the packaging of California dried fruit for export, for the Army's now famous 10-in-1 rations (food for one man for 10 days or for 10 men for one day).

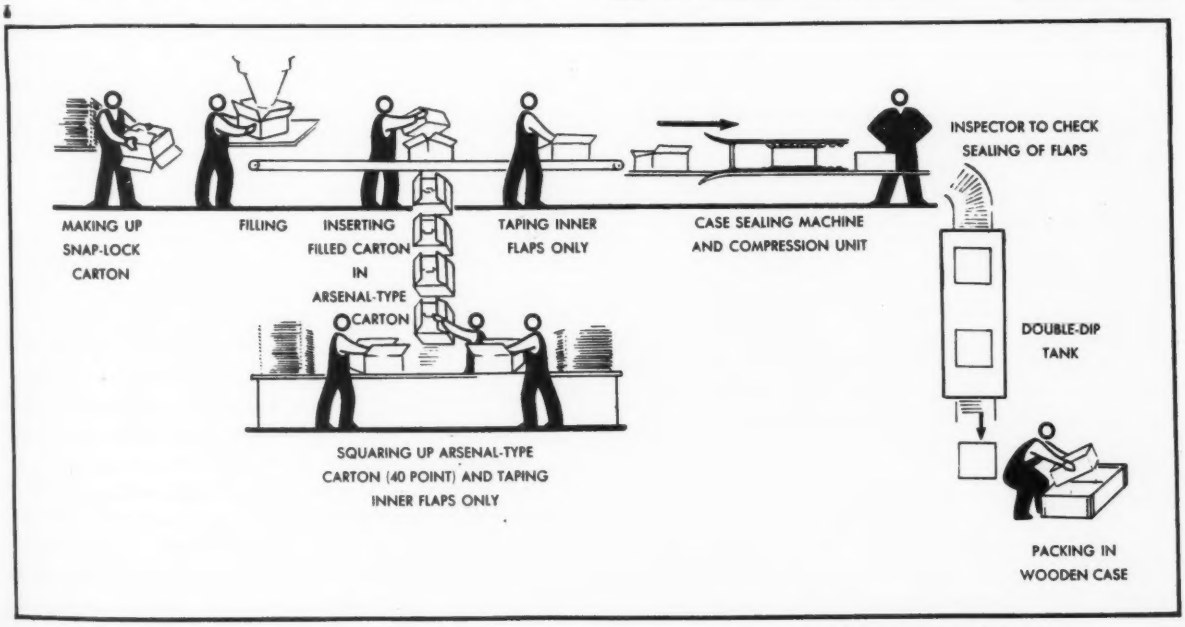
This same method has also been employed for the packing of .50-calibre aircraft ammunition. When this method is used, .50-calibre cartridges are packed 60 to a container, four containers making up the load in the wooden box which is shipped. After the ammunition-filled metal link belt is loaded into the individual, heavy paper container, the top of the box is sealed automatically. Then it passes along a conveyor where the box is inspected for

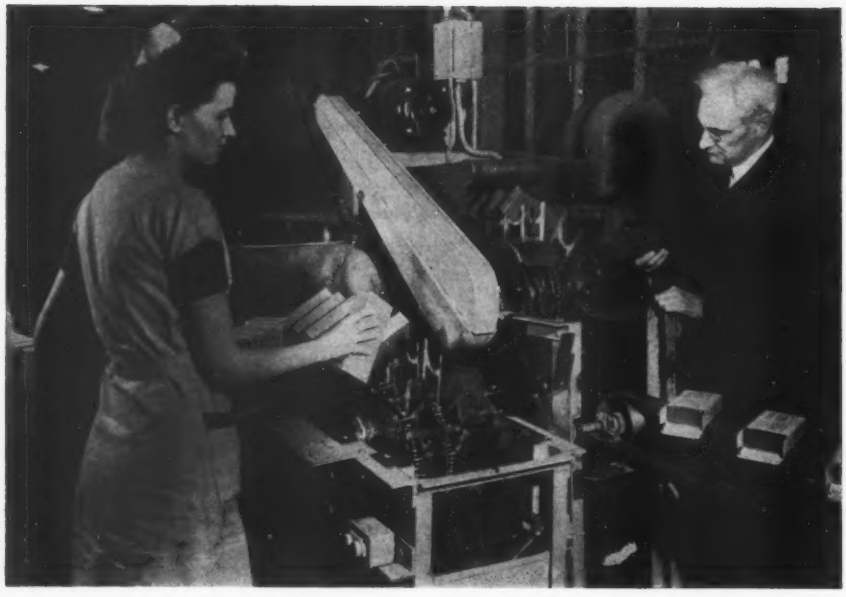
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5—Dry wax method fills openings between fibres of paper, but remaining protrusions, like tiny wicks, absorb moisture. A moistureproof sheet may be made by wet waxing, or applying the wax as a surface coating. Another method of imparting moistureproofness to a sheet is that of laminating two plies of paper together with a layer of wax.
6—Schematic drawing illustrates method of waterproofing packages.

6





7

7—Machine for wax waterproofing being used on Ration K line in General Foods plant. The method is an enrobing action to give the desired penetration. Packages are drained in an angular position to eliminate accumulation of wax on the edges.

breaks. After inspection, the container gets its first bath in molten wax which is heated to 200 degrees. A few seconds later it is immersed again, this time in a 188° bath. After the second immersion, khaki belts are placed around the individual containers. These straps are used in unpacking, since the containers are packed so tightly in the metal-lined wooden box that in the absence of this aid it would be impossible to remove them without damaging the containers.

The double-dip wax application for this ordnance wrap is the same in principle as that being used for the wrapping of the 10-in-1 rations. Cartons for this equipment may be made on standard folding box equipment. Paperboard employed must be carefully chosen. In addition to sufficient strength it must be finished in such a manner that the wax of the first bath will penetrate from 40 to 60 per cent of the board. Cartons must be securely sealed so that no wax enters the package and so that there is no chance of the wax film being broken at the edge of the tabs. Ends must be designed so that it is possible to obtain and maintain a continuous film of wax. Corners must be carefully matched to leave no holes over which the wax film is forced to "bridge" itself. Wax film is in itself structurally weak and requires the unbroken support of the paperboard beneath it.

Packages are taken off the line at regular intervals, say one in every thousand, and tested for their ability to stand up under prolonged storage conditions, rough handling and submersion. In these tests they are subjected to + 140° F. for 24 hr., to – 60° F. for 24 hr., to drop tests and submersion for a continuous period of 24 hr. under a 6-in. head of water.

Further developments

Another development in a wax-waterproofing machine used on the K-ration packing line at the Franklin Baker plant of General Foods, Hoboken, N. J., is described as follows by F. L. Bryant, chief engineer, under whose supervision the installation was made:

> There were a number of methods proposed for wax impregnating and coating of the various ration packs supplied to the Army, but our experience in 1942 led us to the conclusion that the packages should be drained in an angular position so that the residual wax would flow to one corner and thereby eliminate the accumulation of wax which inevitably occurs when the packages are permitted to drain to an edge.
>
> The method of wax application was studied and an *enrobing* action gave the desired penetration on the first pass with 3 sets of nozzles and the proper film thickness on the second pass with 2 sets of nozzles. In both the first and second pass the packages are carried on specially designed carriers that hold the packages so they will drain off at one corner and the nozzles are arranged so that they flood from all four sides, thus ensuring complete coverage.
>
> The machines are equipped with Viking pumps of 55 G.P.M. capacity, the excess wax draining back to a sump tank under the machine where it is strained before passing to the pump suction for recirculation. This sump tank is equipped with an automatic temperature regulator and an automatic recorder.
>
> This whole arrangement makes possible very close control of wax temperature necessary for proper penetration and coating.

Wax coatings on metals

In addition to their uses for waterproofing and moistureproofing all types of papers and paperboard containers including fibre cans with metal ends, petroleum waxes have also been used for coatings on metal. The prewar beer can, for example, was lined with a petroleum wax lining. Since tin became scarce there has also been much discussion of wax coatings for collapsible tubes.

Lead is the only substitute for tin in collapsible tubes at present. Obviously it is essential that contents of collapsible tubes be protected from lead exposure. Most dentifrices will absorb some lead from contact with this metal and lather shaving creams absorb a considerable quantity of lead. Most products with an aqueous base will absorb lead when packaged in bare lead tubes.

8



8—*A representative collection of wax-treated packages. Bread wrappers and paper milk containers are among the most common examples. Lard cartons, paraffin-waxed outside to repel water and prevent stains, have a liner of greaseproof paper.*

It is necessary, therefore, to find an internal protective coating for collapsible tubes containing lead. Such a coating must be non-critical in supply, easily and rapidly applied, uniform, inexpensive, non-toxic, odorless, chemically inert, insoluble in water, have melting point above usual storage temperatures, flexibility and good adhesion to lead surface.

Tube makers differ in their belief in the efficacy of wax coatings for tubes. One company states that after six years of experiment they have no general statement to make because wax compounds differ so widely for various products, as well as equipment used for this purpose by various manufacturers.

Another maker has had some success with microcrystalline base waxes melting at 155°—190° F. Some of these waxes, modified with synthetics, have been used.

Waxes are applied as a final operation in tube manufacture. The tube is placed over a vertical mandrel having an actuating pin on the top. When the tube is pressed down on the pin, hot wax from a pot beneath the mandrel is pumped out through the top of the mandrel, flushing the tube. This cleans and coats the interior of the tube simultaneously.

The tubes are placed on fluted cones attached to a conveyor which carries them through an oven heated about 40°—50° above the melting point of the wax. Thus excess wax is drained off. The waxed tubes are then packed ready for shipment.

New developments in waxing collapsible tubes have been largely confined to using substitutes for the particular microcrystalline waxes. However, government demands on these have made them scarce and more attention is being paid to improve the quality of other possible coatings.

Nearly all dentifrices and lather shaving creams have been packaged in wax-lined collapsible tubes since the WPB tin order went into effect. Some cosmetic and pharmaceutical preparations have also been packaged in wax-lined tubes. A comparison of lead absorbed by the contents of unwaxed and wax-lined collapsible tubes pub-

9



9—*Types of wax-treated paper cans. After fabrication, honey can is sprayed with hot, microcrystalline wax; Sani-Flush and tobacco cans are sprayed inside with paraffin and plasticizer; milk container is immersed in fully refined paraffin. Microcrystalline wax was combined before fabrication in the duplexing paper which is wound to form the body of the baking powder can.*

lished in the *Journal of the American Pharmaceutical Assn.* (Vol. 32, 1943) showed a significantly lower absorption of lead for those tubes which had been coated with wax.

Postwar uses of waxes for tube linings, most authorities feel, will depend on the availability of metals for tubes. Some believe there will be little relief in the tin situation for quite some time, even if the war ends. If this is true, then this may be an additional packaging use for microcrystalline wax.

Thermoplastic coatings

Much is being said these days about thermoplastic coatings. Basically these are made from blends of various waxes which are combined in various ways with non-waxy materials to produce a strong, tough film-forming product resistant to the passage of moisture. Makers say true thermoplastic coatings are a homogenous product throughout the operating range of their use and they do not separate, stratify or throw out in the melting tanks.

In these characteristics, they are said to be different from blends of waxes that do separate, stratify or throw out some of the added ingredients. They rely on a fibre or other base for their structural strength. They vary from hard non-blocking films to soft permanently plastic films.

Most are sealable with heat and pressure. For foodstuffs they are odorless, tasteless and non-toxic. Their melting point varies, depending upon the tasks they are to perform. Application may be made by substantially the same methods as are used for applying other wax coatings. (See discussion under "Production and Application of Waxes," p. 390.)

These thermoplastic synthetic compounds used with paraffin are being used widely for many packages to take the place of microcrystallines. They have been used on jungle rations, mountain rations, the 15-in-1 and 10-in-1 rations. They are used on ordnance packaging for small arms. They are protecting such hygroscopic products as powdered eggs.

Before the period of the war thermoplastic coatings were adopted by Quaker Oats for their small individual pack and by Standard Brands for Diamalt, Honor Brands for frozen foods. New uses are for Friend's baked beans, A. A. Walter Co. dehydrated soup and for other such products.

Cellophane cheese wrappers to take the place of foil have been successfully moistureproofed by these thermoplastic compounds. They may be used as a laminating adhesive.

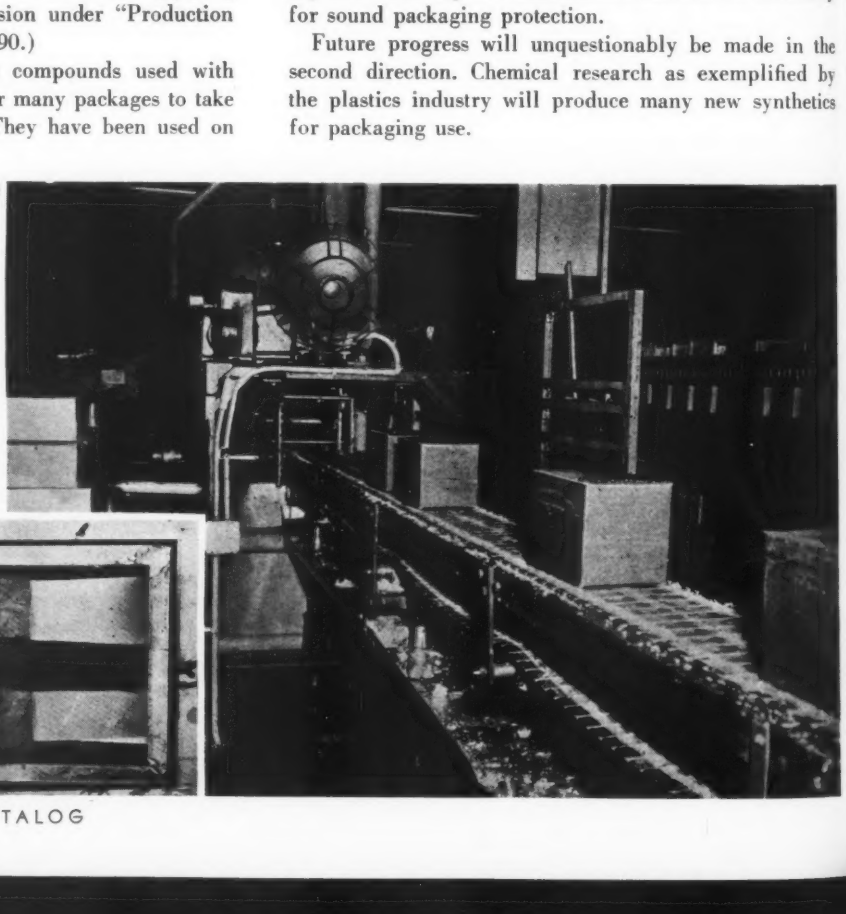
Laboratory tests showed that boxes made from patent-coated-news stock, coated either outside only or inside-outside, provided moisture-vapor resistance in the finished package under 0.10 gram per 100 sq. in. per 24 hours at 100° F. and 90 per cent relative humidity using anhydrous calcium chloride as a pack.

Petroleum waxes are among the oldest materials for imparting water- and water-vapor resistance to packages. As packaging became more complex and required higher levels of protection, appearance and quality, the petroleum industry kept pace with its research and with production demands.

This program has been in two directions: first, in improving the commercial grade of wax and finding new grades and mixtures for special purposes; second, in finding material from other industries to combine with waxes to impart unusual properties of strength, film forming and water-vapor transmission which are so necessary for sound packaging protection.

Future progress will unquestionably be made in the second direction. Chemical research as exemplified by the plastics industry will produce many new synthetics for packaging use.

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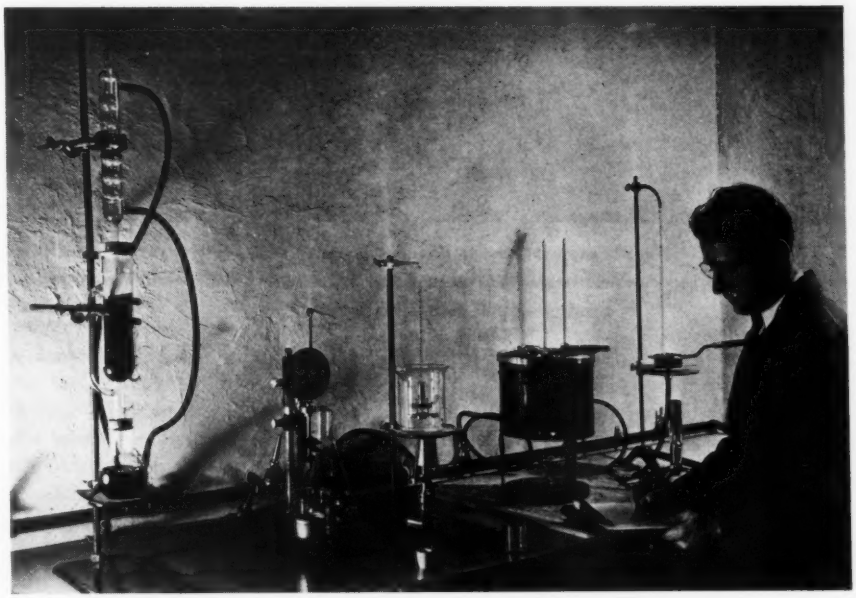


11



10—Double wax-dipped cartons of .50 calibre cartridges leaving the lines at St. Louis Ordnance Plant. 11—Filled waxed cartons are placed four in a metal-lined wooden box. Straps facilitate unpacking these.

Uses of asphalt



1—Equipment for asphalt testing installed recently by Container Testing Laboratories. Left to right, apparatus shown is used for the following tests: extraction, penetration, softening point, viscosity, flash point and fire point tests.

The study of asphalt for packaging is one of our major research projects of the year," said the technical research director of a leading oil company recently.

This statement is further indication of the emphasis being placed today on this oldest of known waterproofing materials—so old some historians claim that Moses' basket in the bulrushes was waterproofed with natural asphalts removed from the asphalt lakes of the Middle East.

The critical supply of petroleum waxes and war requirements have created a demand for every type of water and water-vaporproofing material. Asphalts can be used for many purposes in place of waxes and thus reserve waxes for small packages with more exacting requirements. They also have valuable adhesive properties.

The low cost of asphalt (about 1c a pound) in comparison with paraffins and microcrystalline waxes (5—14c a pound) as well as the abundance of this material are other important considerations not only for the war period, but for postwar packaging. It should be pointed out, however, that no predictions can be made now for the time when other materials, once off critical lists, may be selected on a competitive basis.

Uses of asphalt in packaging

Asphalts have been used for years by paper producers as a laminating material for multiwall bags and for the liners of textile bags. The first patent on this subject was U. S. No. 361,050, issued April 12, 1887, to W. H. H. Childs for duplexing paper by cementing two or more layers with asphalt.

The war has greatly intensified the demand for asphalt-laminated papers used for the walls of solid fibre containers to ship military and Lend-Lease foods and equipment, and as an outside lamination to waterproof paper containers which hold motor oil, paints, printing inks, etc. It has been employed for waterproof flexible films combined of kraft, metal foil, cellulose acetate, cellophane, etc., and for treatment of sealing tapes.

Asphalt is also being used as a coating material by many shippers to waterproof the seals of containers for overseas shipment.

Asphalt or bituminous emulsions for the waterproofing of paper were first made in Europe about 40 years ago, but the use of such substances in watery mediums for the treatment of paper has also received wider attention since the beginning of the war.

One of the most important present-day uses of bituminous emulsions is in the form of sizing applied to multicylinder boards, subsequently used for laminating V-type waterproof containers. The advantage of such applications, it is said, is in the increased amounts that can be added to the sheet to attain exceptional degrees of sizing which is reflected principally in wet strength by Mullen bursting tests after progressive periods of immersion.

Bituminous emulsions have also come into prominence as low-cost extenders for starches, the more expensive urea-formaldehyde resins and other materials now being used in weatherproof laminating adhesives. Such emulsions are entirely different from those used as a size. The basic bitumen is of a tacky nature and the emulsion is a fine dispersion, made stable to the heat and the acids required for catalysis. One of the recent findings in regard



2

2—Loose Wiles Biscuit Co. became a pioneer in the development of asphalt coatings to provide a weatherproof seal on fibre biscuit boxes.



3

3—Research has indicated that corrosion of cans is less in V-boxes with asphalt barriers than in those laminated with other materials.

to this emulsion-starch-resin glue line, it is said, has been the reduction in corrosive action on tin cans. It is believed that this is due to the reduction in quantity of resin and catalyst used, which presumably are factors in the corrosion problem.

Low-cost adhesive types of bituminous emulsion are also now serving as a successful extender of polyvinyl adhesives. The bituminous emulsion is added directly to the finished cooked polyvinyl adhesive.

Because of all these increased applications for asphalt constituents, great strides have been made in methods for handling such materials and more is being learned daily about the physical characteristics and properties of the unlimited varieties of asphalt compounds.

A wider use of asphalts in packaging before the war, producers of these materials now believe, was retarded by lack of knowledge of methods for handling asphalt and its application. Of necessity, the war has meant considerable development in this direction and makeshift installations devised to meet the emergency requirements of today are pointing the way to refinement that can be made after the war.

To many producers of asphalt specialties, the use of asphalt for packaging represents a sizable part of their business. One company said that about 33 per cent of its sales covered orders for asphalts for packaging purposes. Such companies are definitely interested in continuing uses of asphalt packaging after the war. Some of the big petroleum refiners, too, are intensely interested, even though asphalt for packaging constitutes only a small fraction of their total asphalt sales. The reasoning is that many small sources of revenue add up to the big total and therefore research in this direction is a good gamble for future new revenues. Companies, too, which have dealt almost exclusively in newly developed asphalt laminated papers for war shipments will wish to find reconversion uses for such products when the war is over.

Characteristics of asphalts

The American Society for Testing Materials defines asphalts as "black or dark brown solid or semi-solid cementitious materials which gradually liquefy when heated in which the predominating constituents are bitumens all of which occur in the solid or semi-solid form in nature or are obtained by refining petroleum or which are combinations of bitumens mentioned with each other or with petroleum derivatives thereof."

Native asphalt formations have been known since antiquity and were used quite widely as waterproof materials. They were found as crusts on asphalt lakes in various parts of the world. Largest of these are the natural asphalt formations in Trinidad. These asphalts, however, because of their high softening point are not suitable for packaging purposes.

Late in the 19th Century it was discovered that asphalt was a constituent of certain petroleums and could be recovered by distilling off the volatile oils which hold it in solution. Today more than 80 per cent of the world's supply of asphalt is produced at petroleum refineries either by distillation or oxidation.

It is delivered to the user in solid form in blocks that may be melted on the premises or in liquid form by heated tank cars or trucks. Delivery in liquid form is advantageous to the large user, since the hot asphalt may be pumped directly from tank car or truck into the user's plant with less handling. This requires less time and heat to raise the temperature again to the correct degree for application. Tank cars and trucks are usually heated by steam, circulating oil, or chemicals and are so insulated with rock wool or other materials that the temperature of asphalt shipped, say, at 500° does not fall in transit much below the correct temperature for application on arrival.

Asphalt has many of the desirable waterproofing properties of waxes in addition to adhesive qualities, depending entirely upon the grades selected. The number of grades and blends are practically limitless. Differences are due both to the various geographic locations from which the petroleum is obtained and to processing and blending with other materials. Asphalts are sold by grades differing chiefly in softening point, penetration, viscosity, flash and fire point.

The American Society for Testing Materials has established standard tests for determining softening point.

penetration, viscosity, flash and fire point of asphalts. These tests are used in selecting proper grades peculiar to each application. A committee of this organization is also at work on a study of recommendations for asphalts used in paper processing.

Asphalts are hard brittle solids, easily fractured at low temperatures. Upon warming they become progressively softer. The softening point, a term more accurate in describing the liquefaction of asphalt than melting point, is determined by the "ball and ring" procedure. The softening point is recorded at the temperature required for a cake of asphalt to soften sufficiently so that a ball resting upon the asphalt is forced through the standard ring. Penetration is measured by the depth a steel needle will pierce a cake of asphalt at a given temperature, when the needle, weighted with a specified force load, is free dropped on the asphalt. Viscosity is measured by the amount of time required for a specified quantity of asphalt heated to a certain temperature to pass through a Furol tube into a receiving flask.

Important factors to be considered for asphalts used in paper laminations and coatings are pliability, staining, adhesion and cohesion. The asphalt cannot be so brittle that it will crack at low temperatures, yet a grade that may be flexible at low temperatures may have at the same time a softening point so low that the asphalt will liquefy at temperatures too low to be suitable for use in packages shipped to tropical climates. On the other hand a grade that will have sufficiently high softening point for tropical temperatures may be so brittle that it is impractical for packaging purposes.

Viscosity is another factor which must be considered to give the hot asphalt fluidity for proper spread over the paper surfaces at the temperature applied. Flash and fire point must be considered from the standpoint of fire hazards in the plant of the user.

Softening points of asphalts may be as high as 350° F., but for paper packaging they are usually in the 140°—200° F. range. They usually flow readily at a temperature about 100° F. above their softening point.

The thermal properties of asphalts are different from those of petroleum waxes, which have sharp melting points and low viscosities. This complicates their use in packaging. They are miscible with petroleum waxes and petrolatum to a limited extent. The quantities of these materials which can be blended depend upon the nature of the asphalt. For the grades normally used in packaging, the upper limit of solubility is between 25 and 30 per cent of the additive. Above these percentages, it is said, a two-phase liquid system results, which remains separated even after cooling.

Because of their fluidity in molten conditions, waxes and petrolatum blended with asphalt reduce the viscosity of the asphalt appreciably with little effect upon the softening point. This permits application temperatures to be lowered as much as 25° F. Second, they plasticize the asphalt at low temperatures and may help to prevent fracture under these conditions. This is particularly true of petrolatums which may increase the useful range by as much as 35° Fahrenheit.

Testing asphalts

It is estimated that thousands of pounds of asphalt are now being used daily for packaging purposes. Findings of the past year indicating that corrosion of cans was less in V-boxes using asphalt barriers than in V-boxes laminated with other materials and the subsequent Army requirements that such boxes be provided with 1 or 2 barriers of asphalt have made it more important than ever for box makers to have information about the properties of asphalts.

At the request of some 15 makers of weatherproof boxes, the Container Testing Laboratories installed last fall complete facilities for the testing of asphalt. The purpose was to provide an independent source through which box makers could have tests made of various grades of asphalts. Formerly they had to rely entirely on asphalt suppliers for such information.

Apparatus installed for this purpose includes equipment for making tests of softening point, penetration, viscosity, flash and fire point and an extraction test by which it is possible to determine the quantities of asphalt required for laminating per square foot of board.

From results of the series of tests made this group hopes to work out a set of specifications that can be used in ordering correct grades of asphalt for the laminating of V-boards.

Wartime jobs and postwar prospects

Most applications of laminating asphalts have been for shipping container board or heavy kraft papers for multiwall bags and flexible films such as creped kraft liner materials. However, asphalt has been used to some extent for lighter weight paper laminations. Experiments have been made in this field for cigarette wrapping papers to take the place of foil. Where eye appeal is important and where absence of odor is important, asphalt however has limitations. Its dark color is unsuitable for many purposes and the difficulty of applying it to a thin sheet with-

4—Paper containers, like the one illustrated, are used for motor oil and are made with outside laminations of asphalt for weatherproofness.

4



out having it bleed is also a hindrance. Many asphalt enthusiasts believe, though, that certain constituents of asphalt may eventually be used which will eliminate all color and odor.

In what manner this can be done without taking away some of the necessary properties, however, is questionable. It is the combination of the asphaltines, resins and oily constituents of asphalts which gives waterproof and adhesive qualities.

When tin was forbidden for Army biscuits, it became necessary to find a new waterproof container and find it quickly. The difficulty was in finding a satisfactory seal for weatherproof containers. After five months of experimentation, one company[1] developed what was called an Aquaproof seal—a fibre container which had all ends and seams dipped with molten asphalt.

The procedure for accomplishing this Aquaproof seal was carried out in the following manner:

Twenty-four one-pound wax-paper wrapped cartons of Type C Square Ration Biscuits were placed in a weatherproof fibre container. Inside the end flaps, a piece of weatherproof fibreboard was inserted loose directly over the biscuit cartons. The carton then went to an asphalt sealing line.

First one man, using a brush, applied the asphalt heated to more than 300° all over the flaps, the edges and corners of one end of the box. Then he closed the box with hand pressure, turned it over and passed it on to a second man on the line. This man went through similar procedure for the other end of the box. The third man dipped the edge of the box with the manufacturer's seam through a V-shaped trough containing a continuous flow of asphalt. Each end of the carton was again dipped in asphalt to a depth of two inches so that both ends were completely covered.

A strip of 60-lb. kraft paper impregnated with 25 lb. of asphalt per ream was placed over the side seal and square pieces of the same material were placed over each end like a cap to facilitate handling and to prevent blocking. Then two such boxes were enclosed in a larger container and similarly treated.

Equipment used for this sealing included a standard asphalt melting unit and vats on the line made from discarded dough-batch mixing units. Gas units were installed under the vats to keep the asphalt at the proper temperature required.

The company had its troubles in the beginning to find asphalt with proper thermal qualities to do the job, and have had to depend on their suppliers of asphalt for all the research for such performance. They have the highest praise for the research that was done for them by a petroleum refiner from whom they buy their asphalt making possible successful results.

A check revealed that after nearly two years the company is still using this same method of applying an asphalt seal—"Only it must be even better than we thought it was," said a company spokesman, "because we are using only one Aquaseal carton now over the biscuits instead of the two formerly used. The larger outside shipping containers now specified are of wood and nailed shut or of weatherproof fibre and glued. The Army does not now require two asphalt-sealed cases."

Asked what possibilities they thought there were for the Aquaseal after the war, they replied that they had thought it might be a fine thing for export until they talked with their export manager. Said he, "Don't you know that they buy biscuits in South America to get the tins? They roof their houses with them!"

Whatever the future holds, however, this procedure is an outstanding development in methods of handling molten asphalts. Hundreds of inquiries have been received by them from other companies on how to do it, and if there is a need for it after the war, there will undoubtedly be refinements in equipment to handle it.

[1] The Loose-Wiles Biscuit Co.



5

5—Asphalt laminations are used in the paper plies of multiwall bags for flour shipped overseas by the Navy. Dehydrated potatoes for the Navy are packed in cartons with interior liners asphalt-laminated.

Lacquers in packaging

by Paul H. Yoder

The word "lacquer" nowadays has come to mean any coating material which hardens or forms a film by the evaporation of the solvent vehicle.

The number of ingredient materials entering into the formulation of modern lacquers is very large indeed. Lacquers used in packaging are made from nitrocellulose, cellulose acetate, cellulose acetate butyrate, cellulose acetate propionate, cellulose ethers including the methyl, ethyl, amyl and benzyl celluloses. Besides cellulosic film formers, lacquers are made from resins such as vinyl acetate, vinyl acetate-chloride copolymers, alkyd resins, acrylic polymers and the like. Important lacquers are made also from derivatives of rubber and balata, such as chlorinated and cyclized rubbers.

These film-forming materials are sometimes used alone, but more frequently they are employed in combinations with non-film-forming modifying agents, or plasticizers.

Lacquers are applied in packaging to a wide variety of base materials ranging from such very dense, smooth surfaces as cellophane, foil and glassine, through the countless grades of finished, coated and calendered papers, down to such definitely porous materials as cloth, kraft chip board and papier-mâché.

The important relationship between lacquer and kind of surface can be demonstrated by applying an identical coat of a gloss lacquer to a number of different kinds of paper. In one particular case, the desired property of the lacquered paper was gloss. Before lacquering, the different sheets were measured by means of the Hunter-Gardner gloss meter to determine their uncoated glossiness. All of the surfaces were then coated simultaneously with a clear glossy lacquer and the resulting lustre was again measured with the gloss meter.

It may be seen from the gloss figures in the table on p. 400 that, if the production of glossy pyroxylin-lacquered fancy box wrap paper is contemplated, the selection of the base paper is of the utmost importance.

The same kind of relationship exists between the base surface and the lacquer in the coating of components used in moistureproof packaging. In the chart, Fig. 4, is plotted "Moistureproofness" (i. e., the reciprocal of the observed moisture-vapor permeability) of various types of paper as the result of applying various film weights of a moistureproof nitrocellulose lacquer. One axis shows increasing film weight of lacquer up to and beyond 2 lb. per 1,000 sq. ft. and the other axis shows increasing moistureproofness. Observe that for a film application weight of 1-lb. film per 1,000 sq. ft., the moistureproofness of the lacquered cellophane and glassine is roughly ten times that of lacquered, water-finished kraft paper and four times that of supercalendered label paper. The data show further that if a good moistureproofness is required, a porous paper such as M. F. book should not be used, since surface coatings in any practical film weight will not yield the desired result.[1]

The purpose of applying lacquer to such dense, nonporous surfaces as cellophane, glassine, parchment and mechanical greaseproof papers is to accomplish one or more of these purposes, i.e., to make such papers moistureproof, heat sealable or water resistant.

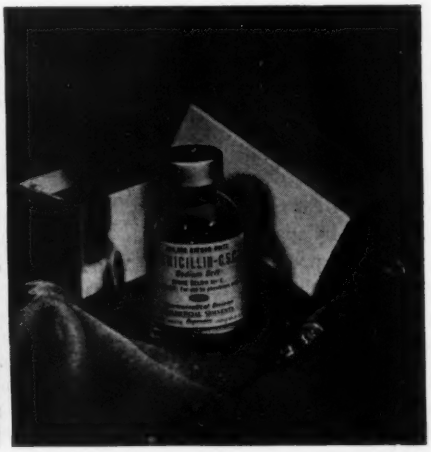
Lacquered transparent foils, such as cellophane, are well known and widely used for packaging innumerable commodities, either in bag form, as an inner or outer loose wrap, or as a laminated structure. Similarly lacquered glassine, which is usually coated on both sides with a heat-sealing moisture-vapor-resistant lacquer is widely used in bags or as wrappers. In general, both lacquered cellophane and glassine may be printed by rotogravure or aniline press. The types of lacquer used on cellophane to produce the several grades available for

[1] Water-emulsion lacquers are used on porous papers with success. These non-penetrating coatings are capable of closing porous surfaces, but their usefulness is somewhat circumscribed by the distortion set up in the paper by the water content of the emulsion.

1



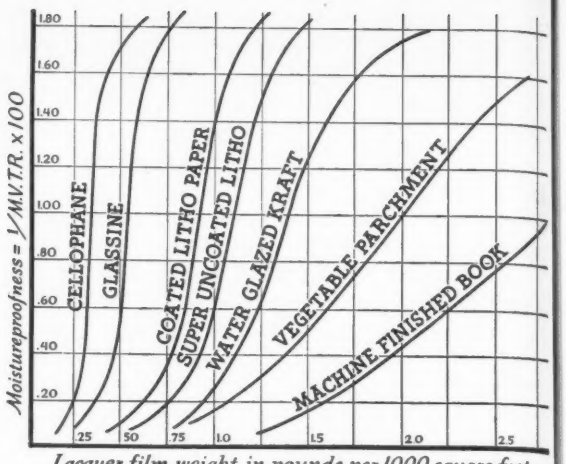
2



1—Lacquer coating prevents wet hands from defacing Jergens Lotion label. The glossy lacquer coating on Worcester Salt package is moisture repellent. Photo, Pyroxylin Products, Inc. 2—Lacquered label on penicillin package prevents finger marks from obliterating important information. Photo, Commercial Solvents Corp.



3



4

3—Special lacquer coating brings out brilliant color of wrappers, resists handling hazards. Photo, Flood and Conklin Mfg. Co. 4—Relation between base surface and lacquer coating for moistureproof packaging.

packaging are usually nitrocellulose base materials. Similarly on glassine, the coatings are usually of the nitrocellulose, chlorinated or cyclized rubber type and the procedure in the case of both cellophane and glassine is to apply lacquer to webs rather than sheets.

On the more fibrous materials such as label and book papers, lacquers are used for both their functional and decorative qualities. Functional lacquers generally are decorative, but relatively few decorative lacquers are more than waterproof. Functional lacquers are usually applied over the printed paper, in order to produce a moisture-vapor-resistant label or wrapper for a fibre can, as a heat-sealing coating for loose wraps or bags, for producing a moisture-resistant loose wrap for cartons, or as a heat-sealing coating for labels and bands.

Insofar as the application of lacquer for decorative uses is concerned, the paper usually used is a coated litho stock or supercalendered label stock. As the name indicates, nitrocellulose type lacquers are most frequently used to produce the so-called "Pyroxylin Coated" papers.

Pigments or metallic powders are frequently incorporated into such lacquer to produce beautiful and novel effects. The resulting lacquered papers are used for laminating or pasting to boxboard for set-up boxes, as well as for wrappers and liner sheets for fancy packages.

Although nitrocellulose lacquers are most frequently used for the decorative types of lacquer, other film forming materials such as vinyl resin lacquers, ethyl cellulose, cellulose acetate and vegetable (corn and soy) protein compositions are being used increasingly as decorative coatings. Certain lacquers made from cellulose ethers and the vinyl copolymer resins, when handled by special techniques, are capable of producing a finished product equal in gloss, flexibility and greaseproofness to that obtained by laminating paper with certain transparent foils.

Lacquers may also be applied to boxboard for both decorative and functional effects. The board is printed before lacquering.

Certain war uses have been found for lacquered kraft paper in the packaging of spare parts for mechanical and ordnance equipment. The lacquers so used must be grease resistant and for some applications must also be heat sealing. In this field, vinyl copolymer, vegetable protein and cellulose acetate butyrate lacquers are mainly used.

Not only are lacquers employed for paper packages, but their use on other types of packages is increasing greatly. For example, the external lacquering of tin cans to prevent corrosion during shipment and storage in tropical areas has been established on a large scale. These coatings are applied either by spraying or dipping, and have been pigmented to camouflage colors to blend with the landscape so that the gleam of the cans does not disclose to aerial observers the presence of a food cache. The critical tin shortage has also created a problem in the manufacture of collapsible tubes for cosmetics, pharmaceuticals and the like. Lacquers of various types have been devised to line lead-alloy tubes to prevent the contents from becoming contaminated with toxic metallic lead. Aluminum and lead-alloy foils are coated with special lacquers to provide heat-sealable foil. Similarly, dyed lacquers are applied on the exterior surface of metal foils to enhance the beauty of the metallic reflection and to produce a brilliantly colored, eye-catching packaging material. Lacquers for metal foils are predominantly formulated from nitrocellulose or vinyl derivatives.

TABLE I.—GLOSS COMPARISON

Kind of paper	*Gloss before lacquering in mil (Gardner)*	*Gloss after lacquer in mil (Gardner)*
Blotting paper	18	21
Machine-finished duplex litho—60 lb.	19	54
Machine-finished, kraft—70 lb.	21	33
Offset Bond	22	51
Vulcanized fibre	23	73
Vegetable parchment—30 lb.	28	66
Water-finished calendered kraft—50 lb.	32	75
Supered Manila—8 point	38	86
Coated one side litho—55 lb.	39	112
Glassine—26 lb.	84	136
Chromium burnished label—60 lb.	88	109
Polished black gloss panel standard for instrument	95	...

Cautions in applying lacquers

by R. L. Buttle

Many new coatings for paper and fabric have appeared on the market. New requirements such as heat sealing, grease resistance and moisture resistance have brought about these developments. Even gloss coatings, decorative only, have changed from the spirit-varnish days partly because of the unavailability of spirit varnish and partly because of the natural improvement of coatings generally as the result of painstaking development and research over a long period of time.

What of the equipment in general use for handling paper coatings of a solvent type? Has it kept pace and is it in the hands of the people who have been doing paper coating for many years? Do these people in turn know the inherent danger of using these coatings with old equipment that was designed for use of entirely different groups of materials? Let us take a quick look at the coating equipment in use today with a view to analyzing existing conditions in this field.

Throughout the country probably the greatest amount of work day-in and day-out is turned out on Chambers sheet coaters with direct or indirect gas-fired heat tunnel for drying. In every city of size these machines can be found and on them gloss coatings are applied to myriad thousands of labels, booklets, menus, pamphlets, etc. The Chambers machine coats only sheets. Gripper fingers grip the edge of a sheet and carry it around a revolving drum. A make-ready, the exact size of the sheet, has been prepared on the surface of the drum so that this area is raised. On its circuit the raised portion is coated by contact with a coating roller, in turn doctored by a smaller roller, both revolving in a fountain of the coating. At a point about ¾ of the circuit of the drum revolution the gripper fingers release the sheet and it is picked off by stripper fingers onto a belt which carries it through the heat tunnel to dry.

In wet or continuous roll coating the usual types of equipment in use are reverse roll, straight roll, nip squeeze with or without smoothing bar, knife, and doctor rods. However, this article is primarily concerned with what happens to the coating after its application, for the results in the heat tunnel are the same for all types of applications.

Now, these new coatings are made of nitrocellulose, ethyl cellulose, copolymer vinyls, ureas, synthetic rubber compounds, cellulose acetate, etc. and, being solvent-type coatings contain, usually, highly volatile solvents. These solvents may be ketones, such as acetone and methyl ethyl ketone, low flash naphthas, ethyl acetate, and/or aromatic hydrocarbons such as benzosol and toluol. They thus present an explosive hazard unless extreme care is taken in handling them.

In order to operate at efficient speeds, heat is necessary in the tunnel to expedite drying. All solvents have an evaporating range, differing with each, but also an N point—which is the temperature at which the end or tail is driven off by volatilization. Thus, it is necessary to have a temperature in the heat tunnel which will bring the temperature of the paper above the N-point temperature in order to eliminate the solvent so that the coating is dry and will not block or stick together whether stacked in sheets or wound in a roll. But this heat is only half of the story! Removal of the heated air into which solvent has evaporated is just as important—in fact more so—both from a drying standpoint and from the standpoint of reasonable safety.

Tests on commercial equipment show that heat alone will not dry a film if evaporated solvent lies on the film surface. The film just stays wet. In the same manner, exhaust of solvent alone, without heat, will not dry the film —it needs elevated temperatures to "kick out" the solvent. But the combination of sufficient heat with efficient solvent exhaust dries the film thoroughly and quickly so that production may be appreciably increased through the accomplishment of higher operating speeds.

That is briefly the theory of solvent coating. But what about the hundreds of direct and indirect gas-fired heat tunnels still in use? The difference between direct and indirect gas-firing (for the purpose of this article) lies in the matter of separation of the gas flame from the part of the tunnel through which the paper passes. For indirect gas-firing this separation is accomplished by a metal partition—usually perforated.

Solvents of the inflammable kind such as those previously mentioned should not be used in gas-fired tunnels as described above. Even if there are no perforations in the division between the paper traversing section and the flame, ovens of this type are dangerous in this writer's opinion because the fumes work around from the coating head and are likely to ignite. Tunnels can be heated with steam pipes, hot air from gas- or coal-fired boilers located in another room, or electrically by buss bar. In each case the radiation should be sufficient to maintain the desired temperature with the exhaust in operation.

The proper relationship of exhaust to temperature is a part of the coating application technique which has received too little attention. The small fellow who feels that an adequate exhaust will waste the heat he has built up is small indeed, for more heat and more exhaust will increase operating speeds.

New fields lie ahead for progressive coaters who will investigate these new finishes. But the first step is to condition the equipment for handling them. To many this will mean a whole revamping of the heat tunnel, while to others it will mean slightly more radiation (infra-red lamps will help) and more adequate exhaust. Whatever it means—don't try to handle these new solvent coatings on old spirit-varnish equipment. It is better to study the situation and make whatever adjustments are required.

Plastic and resinous coatings

by Harold Prince

Developments in the plastics industry, accelerated by the war, have produced new and vital types of packaging. Several of the more useful packaging compounds of this type contain vinyl resins as their essential ingredients.

For example: Airplanes shipped on the decks of ocean-going freighters are now "crated" with a spray of scientifically formulated plastic compound based on vinyl resins. The plastic solution, shot from a spray gun, will dry in less than thirty minutes into a protective coating which hermetically seals the entire plane. Planes treated in this way are immune from the attacks of heat, cold, sleet or salt in their passage to overseas theaters of war. At debarkation points, the plastic coating is readily stripped by 3 or 4 engineers in about an hour—and the plane is ready for action.

In the early days of the war, special cases were engineered for the overseas shipments of aircraft. Under this method of transportation, the planes had to be partially disassembled; the fuselage was packed in one huge case; and the wings, tail surfaces and other subassemblies were packed in smaller cases. All of these cases had to be stowed below decks, taking up valuable cargo space. Reassembly at overseas destinations proved to be both time- and labor-consuming.

Later, to conserve this cargo space, and to utilize the deck space of freighters and tankers, methods were designed for anchoring the planes firmly to the decks of the ships. This type of shipment largely supplanted the former—but presented, however, a new problem of protecting the plane from damage and corrosion from salt air, salt spray, and in heavy weather, even sea water. Various petroleum compounds were employed for this purpose and while some of them were found to be fairly effective from a waterproofing standpoint, none of them possessed sufficient value as a moisture-vapor barrier. Moreover, in the course of an ocean voyage these petroleum coatings would harden, and frequently develop shrinkage cracks. The removal of these coatings at destination required as much as 250 man-hours of labor, as well as large quantities of solvents.

More than a year ago, several progressive companies attempted to improve this method of processing, and undertook research programs to develop a plastic film which could be sprayed over all of the exposed surfaces of the plane to protect it completely from the elements, and which could be quickly stripped upon delivery without the use of solvents.

As a result of this work, successful coating compounds, based on vinyl resins, were developed. Each of these compounds forms an elastic film that flexes with the movement of the plane, does not harden nor become brittle by exposure to sun, wind, or cold, and is readily removed by merely slitting and stripping. Moreover, despite its adhesion to both bare metal and painted surfaces during transit, it will not pull or lift the paint when it is stripped.

One of the important characteristics of these formulas is their low moisture-vapor transmission rate. This is important because it has been found that many coatings may be perfectly impervious to water, but afford little protection against the transmission of moisture vapor.

In tests made by a well-known independent laboratory, in accordance with Navy Specification AND-67, a film, approximately 0.003-in. thick, formed by two sprayed coats of a certain formula,[1] transmitted only 0.47 grams of moisture per 100 sq. in. per 24 hours. A film approximately 0.0045-in. thick, formed by three sprayed coats, transmitted only 0.29 grams of moisture per 100 sq. in. per 24 hours. A recent modification of this formula

[1] Dade Brothers' formula. Other suppliers of new spray coatings based on vinyl resins are:
Aviation Packaging Corporation
Better Finishes and Coatings, Inc.
Irvington Varnish & Insulator Company
Plastiphane Company of America



1

1—Calendered sheeting can be embossed in the conventional platen press. Because of the characteristic sharp softening point in resin D-55, some care is required in the application of the hydraulic loading and in the heating of the press to avoid extrusion of the compound. Photo, Bakelite Corp.

possesses a moisture-vapor transmission rate of 0.18 grams, for a 0.006-in. thickness, tested under the same conditions.

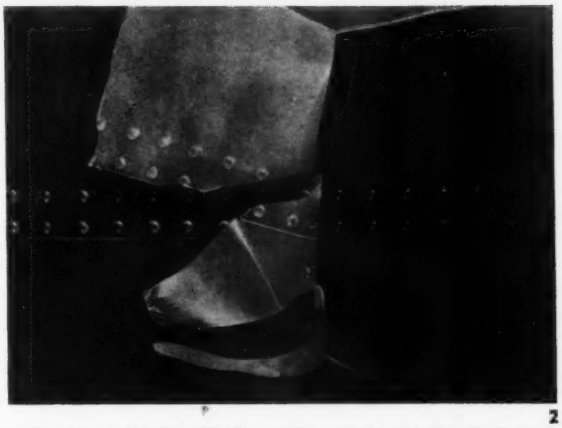
Another type coating,[2] permits application of the plastic package by dipping as well as spraying, and affords maximum protection against weather, corrosive elements, aging and mechanical abrasion. It can, however, be stripped off whenever desired, leaving the original surface unimpaired, and is available in clear and a variety of colors, thereby allowing decorative, distinctive identification, as well as protection during storage or in transit.

Compounds of this type are solutions of vinyl-type plastics in organic solvents. They are formulated to provide maximum build-up of film thickness. They adhere with sufficient strength so that normal mechanical abrasion or abuse does not fracture them. The adhesion, however, is so adjusted that the complete film may be readily stripped when desired. Their salient properties are indicated as follows:

1. *Application*—Spray or dip; allow 30 minutes air dry between coats
2. *Coating thickness*—0.003 in. per spray coat
3. *Film strength*—1400 p.s.i.
4. *Film stretch at break*—180 to 200 per cent
5. *Moisture-vapor resistance*—Good. Passes government specifications No. 14130
6. *Film tear resistance*—Good
7. *Cold resistance*—Will not crack when bent at 32° F. Will bend around 1/8-in. rod at 0° F. Is not damaged at –40° F.
8. *Adhesion*—Will not blow off in air blast
9. *Finish*—Smooth, semi-gloss (except clear, which is glossy)
10. *Solubility*—Soluble in ketones and chlorinated solvent. Unaffected by gasoline, oil, water or alcohol
11. *Corrosion resistance*—Resists acids, alkali, and salt water
12. *Flame resistance*—Will not support combustion
13. *Heat resistance*—Unaffected in 72 hr. at 125° F.

Other interesting materials are vinyl organosols, which are entirely new products in the coatings field. Their use

[2] Produced by Cordo Chemical Company



2

2—The clear protective Vinylite coating used to "package" planes is easily applied and stripped—does not pull or lift paint upon removal.

results in superior coatings produced at low cost. Although these compounds are now employed principally for coating textiles, they may have a great many uses.

One paper coating,[3] meets government specification JAN-P-IN for barrier materials; and another type of coating, manufactured by the same company, is a heat-sealing compound, based on vinyl resins, which retains its shape and adherent properties even at sterilization temperatures of 350° F. The aluminum producing companies of America produce an aluminum foil covered with coatings based on vinyl resins. Used to package dehydrated foods, the coated foil provides a simple, completely waterproof package.

A wartime need has produced a new type of package. At the present time, urgent demands for vinyl resins restrict civilian applications of this new type protective system—but already engineers are considering the possibilities of these simply-applied, easily-removed, water-resistant coatings for uses in postwar packaging. Refrigerators, washing machines, farm equipment, tractors, hydraulic presses, outboard motors, and many other types of household and industrial equipment may soon be shipped in form-fitting "cartons" of vinyl-type resin film. Today—safe passage for aircraft. Tomorrow—packages from a spray gun.

[3] Produced by the Gordon-Lacey Chemical Products Company

3—All-around labels coated with rubber resin reduced moisture pickup in 2-lb. salt package. Other hygroscopic products also benefit.

3



4—Photo illustrates method of dipping cheese directly into the resinous wax mixture. Wax coating strips off without affecting flavor.

4



Applying thermoplastic coatings

by Robert J. Gray

Unit packages, used in ever-increasing quantities for civilian and war purposes, particularly for such moisture-sensitive products as ready-prepared foods, dehydrated eggs, coffee and milk, have demanded constantly improved protective materials. Waxed papers were followed by moistureproofed cellophane and pliofilm. Simple cartons were replaced by inner-bag cartons plus one or more outer wraps. Multiwall paper bags, or combinations of laminated papers with metals and other moisture-resistant films, have also been employed in the fight to keep moisture out or to keep it in.

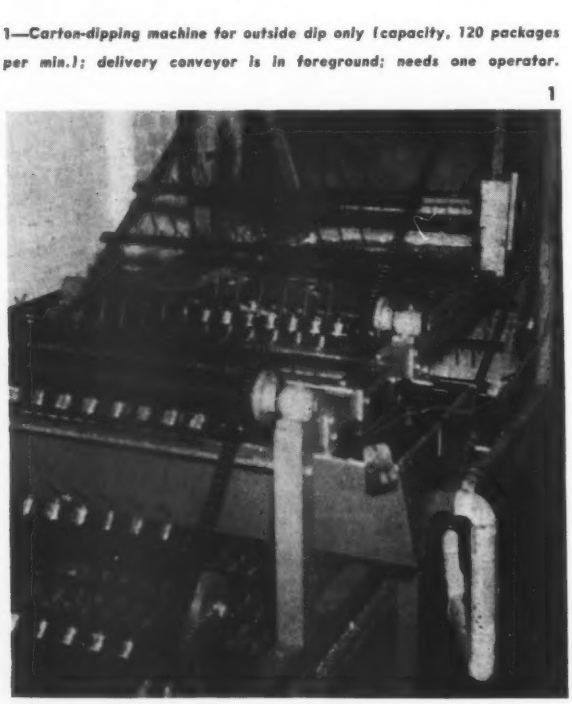
Contrary to general belief, this search for improved moisture-resistant coating is not a result of the war, but the culmination of a prewar development which became complicated by a scarcity of raw materials, necessitating development of new materials to do the work.

Thermoplastic coating materials

These new protective materials are the outgrowth of earlier wax coatings, but they are new kinds of products, differing in many respects from their antecedents. Known as thermoplastic coating materials, they are solutions of blends of selected waxes with high polymeric, non-waxy material of complex molecular structure which inhibit crystal formation and favor continuity of film which results in impermeability to the passage of moisture vapor. These materials are homogeneous throughout the operating range of their use and do not separate, stratify, or throw out in the melt tank. Their films are tough and continuous, and can vary from a hard, non-blocking coating to a soft, permanently plastic material used for combining. Perhaps the greatest advantage of thermoplastic coatings is their controlled viscosity over a wide temperature range, as compared with the wide viscosity variations within narrow temperature range of normal waxes or blends. This controlled viscosity gives a more foolproof material from the operating point of view and yields uniform coatings.

1—Carton-dipping machine for outside dip only (capacity, 120 packages per min.); delivery conveyor is in foreground; needs one operator.

1



Since we can build new materials with predetermined characteristics, thermoplastic coating materials are now designed to do specific types of jobs, tailor-made, if you will, to the need. One manufacturer divides his products into five general classifications:

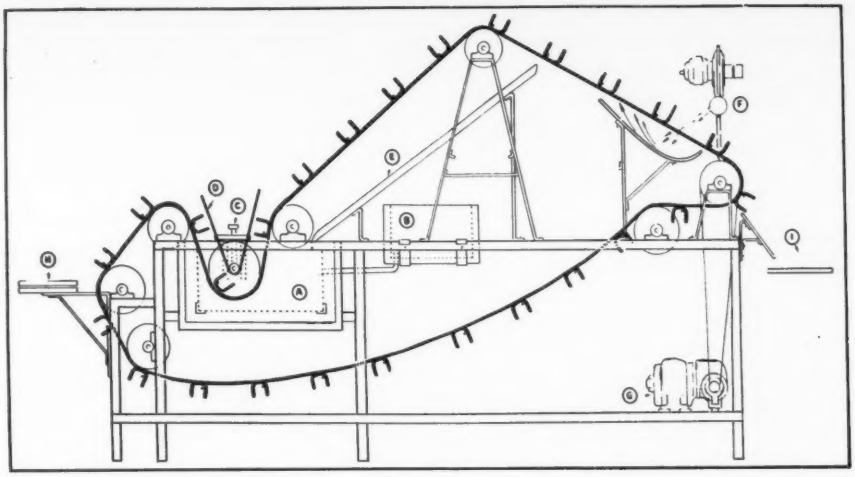
1. Dipping materials for the outside or inside-outside coating of finished containers made of fibre
2. Coating materials to supply moisture-vapor resistance to sheet materials and to yield heat-sealing films
3. Laminating adhesives which resist flow, squeeze, and ply separation during heat sealing and are used for sheet materials, laminated either to each other or to carton stock, where moisture-vapor resistance is necessary
4. Coating materials for metal tubes
5. Solvent solutions and dispersions for spray application or dipping where thin films are desired.

This concept of building specific materials to do specific jobs has resulted in a closer cooperation between cartonmaker, thermoplastic coating supplier and packer. Correctly designed packages have unlimited possibilities, thereby opening wide fields of usefulness in industry. Packers, besides giving information about the physical characteristics of their products, should specify range of package sizes, type of equipment available, speed of operation, floor space, etc.

Check these factors before choosing your coating:

1. Carton design:
   - Flap construction
   - Tight corners
   - Accurate die cutting
   - Proper location of scores
   - Proper scoring
2. Type and calibre of board stock
3. Finish of carton stock
4. Sizing of carton stock
5. Type of packaging equipment to be used
6. Type of filling equipment to be used and if it will tear the carton
7. Forming facilities for carton
8. Sealing facilities for carton
9. Shape and size of mandrels
10. Adjustment of adhesive applicator

2



2—Tank for single-dip thermoplastic coatings: (a) dip tank with steel jacket for steam heating; (b) pre-melt tank connected to dip tank through constant-level, float-control valve; (c) adjustable bearings vary immersion time; (d) baffle rods to keep packages submerged while in the dipping vat; (e) heated drip pan; (h) loading conveyor belt; (i) discharge conveyor belt.

11. Adjustment of compression belts
12. Type of coatings to be applied:
    - Single dip
    - Double dip
    - Inside-outside (Dacca) dip
13. Estimated production speed
14. Floor space available

Of equal importance with package design, paper stock and thermoplastic coating selection are the adhesive and the care used in sealing the filled cartons. No coating material has a chance of success with sloppy seals. A few pennies saved in cheap adhesives may prove an expensive economy. Care both in application and compression-belt adjustment are of paramount importance, for a poorly sealed carton cannot be "plugged up" tight with even the best of thermoplastic coating.

Methods of application

Having determined the correct package design, the carton stock and the thermoplastic coating characteristics, the type and size of applying machine depend largely upon the size of the package and the number of packages wanted per day.

There are available single-dip machines for packages 10—200 cubic inches. Here the filled and sealed carton is placed in a continuous-link belt conveyor, completely immersed in a bath of molten thermoplastic coating material, and cooled for about one minute before inspection and final packaging in shipping containers. Such a setup is diagrammatically illustrated as Fig. 2. On a machine with 6—8 packages per link, a production of about 6000—7500 units an hour is a reasonable figure

The double-dip method of coating has largely been used on shipping cartons up to 850 cu. in. in size. They are the "arsenal-type" carton made of 40-point jute or double-kraft-lined chip correctly scored and cut. After the carton is set up, the package is loaded, the inner flaps bent over and a small piece of gummed tape about 4 in. long placed over the joint of the flaps at the spot where the crossing of the inner and outer flaps leaves a pinhole. The carton is then properly squared up and sealed in a suitable automatic gluing and sealing unit. The flaps are held down by compression belts for about 1½ minutes. The package is then inspected and sent through a double-dip machine.

The first dip is of about 15 seconds' duration in a bath of molten thermoplastic coating at approximately 200° F. This allows a penetration of about 40 per cent of the carton stock and gives an anchorage for the coating. The dipped carton is then immersed for 4—6 seconds in the

3

3 IN 1 METHOD							DOUBLE-DIP METHOD				
CONSTITUENTS	CORRUGATED CASE	TAPE	CORRUGATED PADS (2)	ENVELOPE BAG	CHIP LINER	WEATHERPROOF FIBRE CASE (END)	CONSTITUENTS	SNAP LOCK CARTON	TAPE	ARSENAL TYPE CASE	THERMO PLASTIC
COST*	$52/M	90¢/M	$10.10/M	$250/M (about)	$580/M	$170/M	COST*	$70/M	10¢/M	$60/M	$54/M
CRITICAL MATERIAL (pounds of pulp)	900#/M	10#/M	160#/M	POUNDAGE VARIES WITH TYPE ENVELOPE USED	50#/M	2100#/M	CRITICAL MATERIAL (pounds of pulp)	1190#/M	1#/M	960#/M	
PULP PER 1000 UNITS 3220 POUNDS (excluding pulp in envelope)							TOTAL PULP PER 1000 UNITS 2151 POUNDS				

3—Comparative costs of the 3-in-1 coating method and of double-dip method are illustrated in the chart. Figures are based on costs prevailing on November 17, 1943.

second dip tank, which is held at 165°—175° F. depending upon the board stock and speed of machine. When cooled, this gives a thin, continuous, uniform coating which is hard and non-blocking. The coating film has a high degree of tensile strength, high cohesion and firm anchorage. Since all fibres are covered, there is practically no wickage or seepage of moisture vapor into the package. Exhaustive tests have shown an extremely high resistance to insect infestation because the hard, smooth film and corners give no grip for even the most avid insect.

The Decca method of applying thermoplastic coating consists of immersing a fully formed or set-up, yet unfilled carton, whose bottom flaps have been glued, into a molten bath of thermoplastic coating material, coating both inside and outside surfaces of the carton. The carton is inverted and drained in a hot chamber and then cooled to give a thin, uniform coating. After filling, the package is heat sealed, using either the coating material for sealing or through the use of secondary, booster thermoplastic adhesives applied to the flaps.

Several other types of machines, such as chocolate enrobers or milk-container dipping machines, are available for applying these thermoplastic coatings.

Resistance to moisture-vapor penetration as well as moisture itself depends entirely upon the design and care with which the container is made. However, with well-made production samples, repeated laboratory tests have shown that boxes made from patent coated news stock, coated either outside only or inside-outside, provided moisture-vapor resistance in the finished package under 0.10 gram per 100 sq. in. per 24 hours at 100° F. and 90 per cent relative humidity, using anhydrous calcium chloride as a pack. Millions of ration packs containing such hygroscopic materials as dehydrated cocoa, milk, sugar, hard candies—for example, the famous Jungle rations—bear out these laboratory findings.

Packages using thermoplastic coatings

In addition to use on Army rations, thermoplastic-coated containers have been used for several years on such hygroscopic products as cereals, dry malt powders, powdered eggs, dehydrated beans, soups, etc. They have also been used to prevent dehydration of frozen vegetables and fruits. Whether the requirements are to keep moisture vapor out or prevent loss of moisture vapor, these new thermoplastic-coating materials have a wide range of application.

Comparison with other methods

Since the per pound cost of a coating material is meaningless, the comparison of manpower, materials and paper consumed (Fig. 3) is interesting. All figures are based on costs prevailing on November 17, 1943, and manpower on an average of several installations which were observed at that time.

Coatings for sheet materials

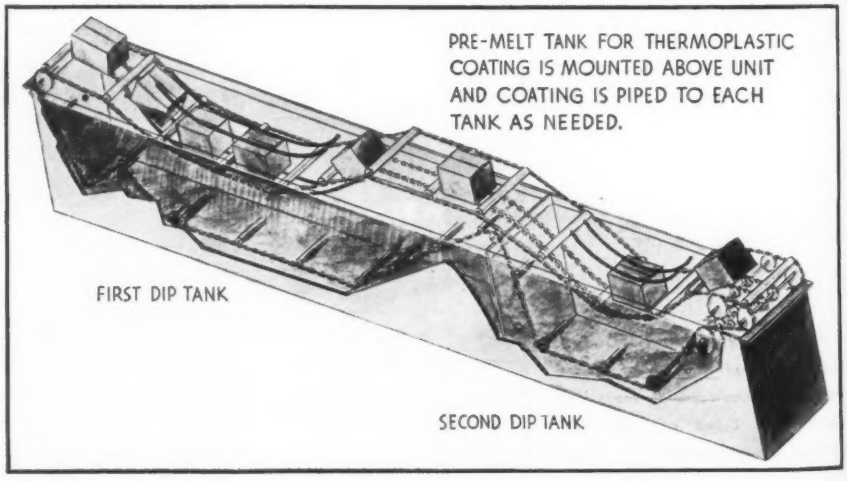
The controlled viscosity of these new thermoplastic coating materials over a wide temperature range is of particular advantage in coating sheet material. It permits the application of continuous films which, because of their cohesiveness, give both moisture-vapor protection and also permit heat sealing of packages made from the coated sheets. When applied to printed cellophane, it gives a superior product for holding packaged cheese. Coated paper stocks are used, for example, on hard candies, which are very hygroscopic.

Here also, the nature of the thermoplastic coating material can be varied to meet the nature of the job or the composition of the sheet material itself.

Thermoplastic laminating adhesives

The problem of laminating adhesives is one of building materials that are permanently plastic—yet which retain bond strength, cohesiveness and tack—to hold the plies together, while yielding an impervious, moisture-vapor protecting film. The cohesive strength of the thermoplastic coating is particularly important where the laminated material is made into bags and heat sealed. Unless the laminating adhesive possesses a stringy, tenacious body, it will tend to delaminate during heat sealing, making an unsightly seam and "gumming up" the heat-sealing unit. The proper formulation of true thermoplastic coating overcomes this trouble entirely.

4



4—The schematic drawing at right shows an overall picture of the double-dip tank. The first dip is of about 15 seconds duration in molten thermoplastic coating at approximately 200° F. Carton is then immersed 4-6 seconds in the second dip tank at 165°—175° F.

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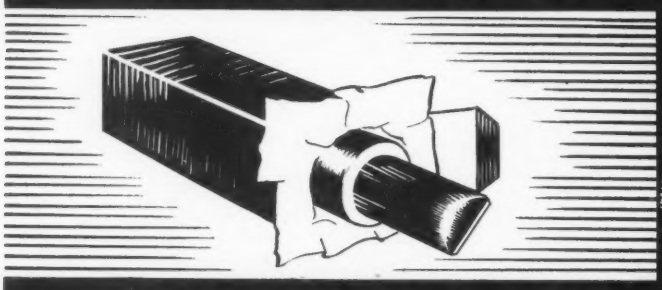
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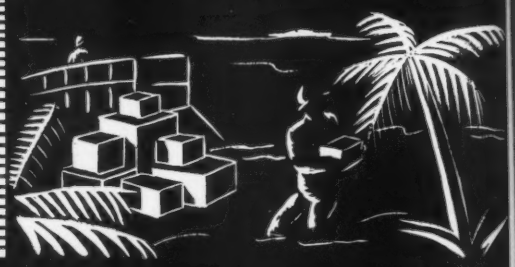
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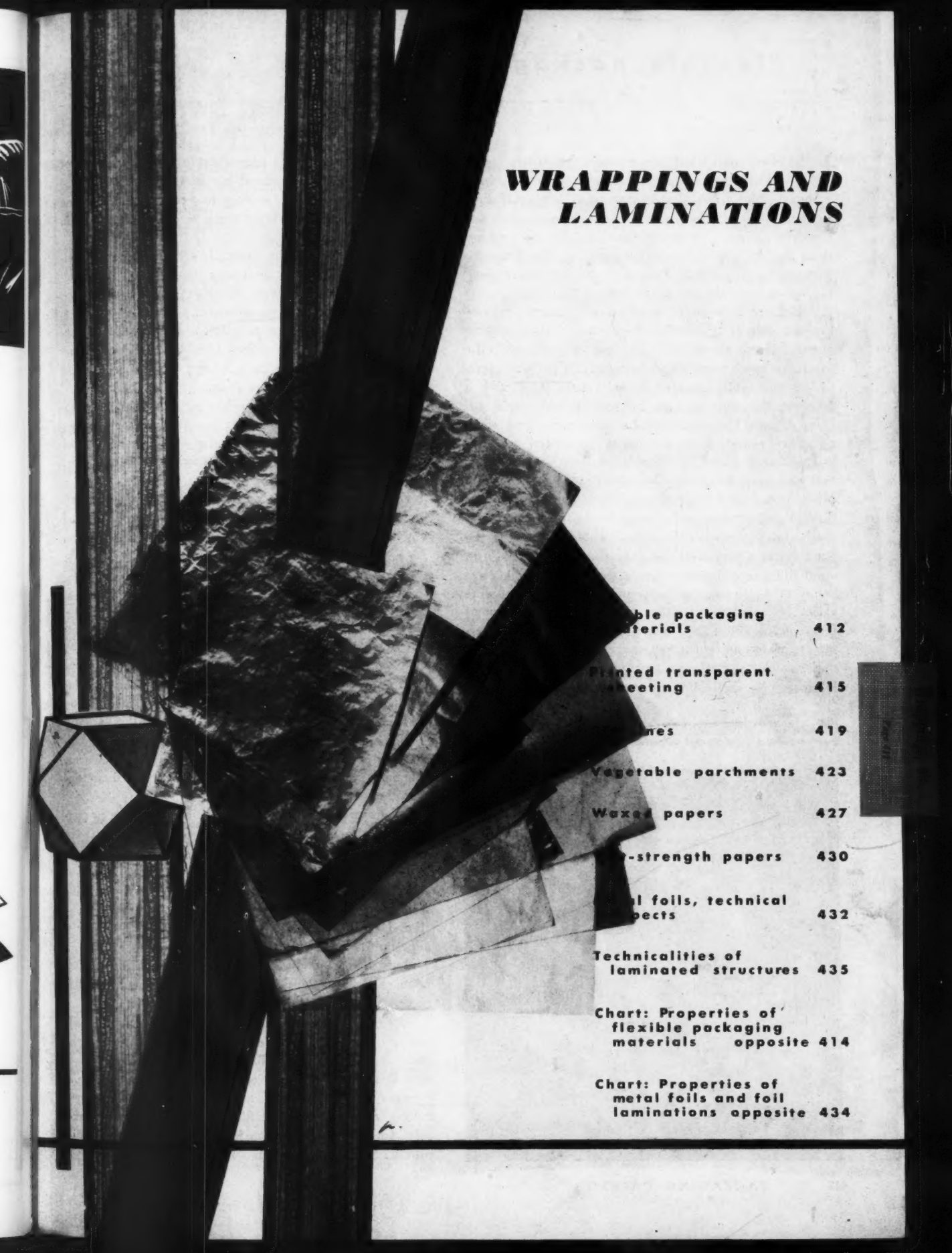
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...ble packaging ...terials 412

Printed transparent ...heeting 415

...nes 419

Vegetable parchments 423

Waxed papers 427

...-strength papers 430

...l foils, technical ...pects 432

Technicalities of laminated structures 435

Chart: Properties of flexible packaging materials opposite 414

Chart: Properties of metal foils and foil laminations opposite 434

XUM

Flexible packaging materials

In the insert chart which accompanies this article (opposite p. 414) the more important data concerning the basic materials, and a few of the many possible combinations and treatments are briefly tabulated. The chart does not, however, indicate new trends, the reason for the combinations nor the uses of the materials listed. The following paragraphs supply such facts and give a better over-all picture of each class of materials.

All of the transparent films are now being produced for war uses or to meet very essential civilian requirements. Indeed, all except cellophane (regenerated cellulose) are being manufactured exclusively for war applications, and while much of the cellophane production is going in the same way, an appreciable volume is still being directed to those essential civilian uses permitted by the War Production Board's limitation orders.

The war demand for some films has been so great that equipment has been allowed for increasing the resin production. New film producers have come into the field through adjustments and changes in equipment not originally intended either for film production or for the handling of a particular resin. This applies especially to vinyl films (copolymer chloride-acetate, etc.) which are being used primarily as waterproof covers for a wide variety of equipment, either to protect the equipment from casual wetting under certain conditions or as permanent water- and dustproof covers.

For such applications, cast films—from solvent solutions—have shown definite superiority over the calendered type in physical properties for a given weight of film. However, the demand has been so great, and the calendering process is so easy to perform with existing equipment, that such films are now being employed in the heavier gauges.

High in moisture resistance, poly-vinylidene chloride (saran) films protect vital metal parts against corrosion, dirt. Photo, Dow Chemical Co.



All of the transparent materials are at present competing with other uses for their base resins, plasticizers, pigments, etc. In some cases, since the other uses for the resins are greater than the film uses, there can be no hope of materials for civilian purposes until the total war demands for the base resins have been reduced. Cellophane is in the same position since it competes with rayon and other uses for high quality pulp.

During the past year a variety of films has been produced experimentally, but only two of these films appear to be interesting enough to warrant a full description of their properties. They are polyethylene and polyvinyl alcohol, of which more below.

For these new films, as well as for all of the well known films, the physical and functional properties, and not the degree of their decorative values, is the criterion for current use.

Regenerated cellulose films

This type of material comprises the bulk of the transparent films in production today. It is transparent, colorless, slow burning and affected by changes of the humidity in the atmosphere. The fact that this base is hygroscopic, or water-wettable, makes it possible to use the film for products having high fat content, but it also results in a film which has no moistureproofness.

The most widely used form of regenerated cellulose sheeting is that with a coating of moistureproof lacquer. The moistureproof film is used in much greater quantities than the uncoated film.

Because the functions of the resulting film are properties of the lacquer coating, it is possible, by varying the lacquer composition, to produce films having high or low moistureproofness and with or without heat-sealing properties. However, if the film is to be used in contact with free water, it is usually necessary to use a so-called anchored coating which is especially made to give better adhesion of the lacquer to the cellulose base.

Many of the modifications of cellulose films depend upon changes in the degree of plasticization to meet the needs of a particular product or packaging machine.

As a result of the demand for increased moistureproofness and greater toughness and strength, there has been a great increase in the volume of cellulose films which have been laminated to each other or to other materials —paper, metal foils, etc. The addition of a suitable laminating agent can improve the physical properties markedly, and the resulting film has found many war applications. Such films are being used for large units of de-

hydrated foods, for field-ration units and for obtaining resistance against war gases.

Cellulose acetate

Cellulose acetate had been increasingly used in our peacetime economy because of its dimensional stability under varying atmospheric conditions. It also possesses other physical properties which made it suitable for use in rigid transparent containers.

Cellulose-acetate films differ radically from regenerated cellulose because the acetate base is water-insensitive and can only be put in solution by certain solvents. Its manufacture is more involved, and since its base material is usually cotton linters rather than wood pulp, it is higher in cost than regenerated cellulose. The acetate film is unusually brilliant and clear, but possesses no useful degree of moistureproofness. Because of the effect of some organic solvents on the film, and because of the poor adhesion of lacquer coatings, it is not usually lacquered, although the resulting film would be one which would have excellent moistureproofness.

Cellulose-acetate film is very stable to dimensional changes with varying atmospheric humidities. As a result it has been widely used as windows in cartons, bags, etc., and as a surface layer when laminated over decorative and printed papers and fibreboards.

Cellulose acetate has good stability against outdoor exposure and when laminated to cotton scrims, has been used as a glass substitute. It is now finding war uses as a laminated material in connection with various cloth and paper combinations to produce stable, moistureproof wrappers and liners for export shipments.

Ethyl cellulose

This film was just beginning to be employed before the war restrictions and curtailments removed it from the civilian market. Ethyl cellulose is extremely stable to alkalies, heat and light, and is extremely clear and inherently flexible. Its moistureproofness is about the same as cellulose-acetate. (See *Plastic Strip Coating*, p. 597.)

Ethyl-cellulose sheetings can be made moistureproof by the addition of suitable lacquers as surface coatings. Although the base material is stable when melted, the film is an extremely difficult one to heat seal except under special conditions.

Ethyl cellulose is being produced to a very limited extent today for highly specialized war uses. Apparently such applications require the particular properties of this film and are such that they cannot be disclosed.

Rubber-hydrochloride film

In several important ways, rubber-hydrochloride film differs materially from the films previously described. First, its base is rubber and not cellulose; second, it is inherently moistureproof and capable of strong heat seals without added coatings.

Processes of manufacturing consist of adding hydrogen chloride gas to a special grade of crude rubber. The resulting resin is dissolved in solvents and placed on a moving web which is passed through a heating chamber to evaporate the solvents and thus leave a transparent film.

Rubber-hydrochloride sheets are extremely tough and can be stretched to a higher degree than any of the cellulose-base films. In heavier gauges, the film is slightly cloudy. The stability of rubber films is poorer than cellulose films especially when they are exposed to heat and to direct sunlight.

Since this film has the property of making strong welded seals, it offers possibilities for the packaging of certain liquids which could not be successfully packaged in any other film.

Because of the rubber shortage, no civilian use of this material is allowed. However, some of it is manufactured and laminated for the packaging of aircraft engines by Method II (use of desiccant).

Vinylidene-chloride films

The past year has seen increases in the quantities of this film available for war uses. The early production of vinylidene-chloride films was chiefly confined to extruded tubes of a limited number of diameters. Continued research and engineering have developed means of producing this material in roll form and also have evolved apparatus for effecting satisfactory heat seals.

Heat sealing of this material is not, however, a simple matter without such specialized equipment, because of the shrinkage characteristics of the material as manufactured. With new specialized sealing equipment, however, durable seams can be made.

Vinylidene-chloride films are manufactured by a very unusual process because the resin is nearly insoluble in common solvents and also because it does not lend itself to the usual calendering operations. The film is made by nearly simultaneously heating the resin and forcing it at great pressure (because of its viscosity), through a circular slit orifice. The extruded product is a thin-walled tube which must be cooled, oriented and slit to make a clear flat film.

This film has, inherently, the best resistance to water-vapor transmission of any transparent film and it is strong and durable even at sub-zero temperature.

It is in limited production and is being used for special applications of Method II, packaging of metal parts and optical equipment using silical gel.

Vinyl films

The vinyl films presently available are usually mixed polymers of either vinyl chloride or acetate, or copolymers of both.

These films are being made by two widely different methods. One process uses the familiar procedure of casting a film from solvent solutions of the resin followed by a careful removal of the solvent. The newer method is that of squeezing out a hot plastic film of the resin between two rolls and then allowing it to cool. This method is called "calendering," since the equipment is similar in appearance to conventional calender stacks.

The method of solvent casting has certain advantages. It can make very thin films, it can make films of a wider range of base resins, and the films which are produced

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by this method are completely transparent and have shiny surfaces.

The calendering process is limited by the thinness of the films it produces, the type of resin and the fact that the films are translucent to opaque depending upon their thickness. However, this process has the advantage of lower cost and less complex equipment. Both types of films are finding increasing war uses as durable, waterproof and easily heat-sealed barriers and covers. So far no vinyl film of either type has been produced which has a useful level of water-vaporproofness.

Polyvinyl alcohol

Films of polyvinyl alcohol have been laboratory curiosities and even now they are being produced only in very limited quantities and for very special high-priority uses.

This transparent film is unusual in that it is water soluble—as a matter of fact, it is made by casting a resin out of a water solution. The resulting film is exceptionally clear and brilliant; has unusual strength properties in normal conditions of temperature and humidity. Since it is a hydrophylic (water soluble) material, it is, of course, completely impervious to oils and greases. Likewise it is very much affected by humidity.

Polyvinyl alcohol films can be made in two types: one soluble in cold water; the other soluble in hot water. As yet, no uses for this film have been announced. It will be interesting to see the importance which this water-soluble film will assume.

Polyethylene

The second new film which is being offered experimentally, both as a cast film and as a calendered film, is polyethylene. This resin is being produced in large quantities from ethylene obtained from petroleum cracking and as a component in natural gases.

Polyethylene, in general, is characterized by its extreme toughness and rubberyness and by its excellent electrical properties. This second property is responsible for the fact that large amounts of the resin are being used as extruded sheath for the insulation of electrical wiring. The film cast from solution is slightly cloudy, while the calendered film is translucent.

Theoretically, polyethylene, because its chemical composition and molecular weight, should be extremely resistant to moisture absorption and water-vapor penetration. However, samples of the film have not shown the extremely low water-vapor permeability which has been expected of them. For example, a film of 1½ mils in thickness made by the casting process shows a transmission rate of approximately 0.6 grams while a 3-mil film shows a transmission rate of approximately 0.25 grams per 100 sq. in. at 100° F., 95 per cent R. H.

Polyethylene sheeting can be heat sealed at about 250° F. to make welded joints which are strong and have functions similar to the original sheeting. These films are too new to have found any large or important applications, but technological improvements in polyethylene sheeting can be expected as well as new uses to which it will be uniquely adapted.

Paper products

Paper is almost always used to provide strength and durability, or as a base for printing or surface coatings. The only two papers which in themselves have other functions are glassine and parchment which are inherently greaseproof and, to some degree, flavortight. Actually, parchment gains these properties after leaving the paper machine. Glassine, therefore, is the only one which, per se, performs a chemical function. (For fuller information about the kinds of functions, see *Testing Package Materials and Packages*, p. 59.)

Paper is a low-cost medium for obtaining mechanical properties, and it can provide an attractive surface for printing and decoration. With the exception of glassine, all chemical properties must come from additional treatments or materials or they must be the result of combinations with other films.

The mechanical properties of papers vary widely depending upon the source and treatment of the pulp, the paper-machine operation, the calendering operations and the ream weight of the finished paper. Papers other than glassine are not efficient bases for many kinds of coating operations without such additional surface treatments as sizing, pre-coating, calendering or the addition of pigmental mixtures (coated papers). To produce surface or intact films, paper coatings or laminating agents must possess thixotropic (anti-penetrating) properties unless saturation of the paper base and use of relatively large amounts of agent are not deterring factors. (Dry wax or asphalt-saturated papers.)

Unfortunately, the saturation of the paper base causes the paper to develop some of the physical properties of the agent used. This results in loss of flexibility and perhaps of some strength factors.

Paper to paper combinations or paper coatings do not, in most cases, have extraordinary chemical functions. Glassine or parchment, however, can be combined (laminated) or coated with relatively small amounts of agents to give structure of excellent chemical properties. Glassine and parchment are efficient in this respect because most agents behave similarly to oils, and these papers are not penetrated by and do not absorb oil materials. This property of glassine and parchment can be used with proper techniques and equipment to combine them to papers and obtain structures approaching the function and efficiency of all-glassine and parchment sheets. Similar results can be obtained with a regenerated-cellulose or plastic base sheeting, although differences in dimensional stability with humidity changes make such combinations liable to distortion and separation.

The paper industry is using increasing quantities of various synthetic resins to impart higher levels of wet strength, and unquestionably newer resins will be found to improve other mechanical properties and prepare paper for easier coating, etc. Since there appears to be little likelihood of immediate or radical changes in pulping or paper-making processes or equipment, the development of such synthetic-resin treatment appears to be the most important advancement which is being made in the paper industry.

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PROPERTIES OF FLEXIBLE PACKAGI

The values reported in this chart were obtained from various sources and are believed to represent acceptable commercial standards. Special grad

Manufacturers should be consulted for additional special information or for new uses of their materials. Because of wartime restrictions,

PROPERTIES	CELLULOSE DERIVATIVES					VINYL RESINS	
	Cellophane Plain	Cellophane Moistureproof	Cellophane Moistureproof Anchored	Cellulose Acetate	Ethyl Cellulose	Vinyl Films Vinyl Chloride or Vinyl Cl and Ac.[4]	Vinyl-Coated Paper[4]
GENERAL							
Type of Material	Regenerated cellulose	Lacquered regenerated cellulose	Anchored, lacquered regenerated cellulose	Cellulose acetate	Ethyl cellulose	Vinyl resins	Vinyl resins on paper
Forms Available	Sheets & rolls	Sheets & rolls	Sheets & rolls	Sheets & rolls	Sheets & rolls	Rolls	Rolls
Clarity	Transparent	Transparent	Transparent	Transparent	Transparent to opaque	Transparent to translucent	Opaque
Thickness Range, in.	0.0008–0.0015	0.0009–0.0017	0.0009–0.0017	0.00088–0.0015	0.001–.020	0.001 or more	Resin 0.001 or more
Maximum Width, in.	44	44	44	48	25	40	40
Area Factor, sq. in. per lb.	12,400–23,400	11,600–21,000	11,600–21,000	14,600–25,000	24,300 or less	2,300 or less	—
Specific Gravity, approximate	1.45	1.40–1.55	1.40–1.55	1.25–1.35	1.14	1.14	1.40
MECHANICAL							
Tensile Strength, lbs. per sq. in.	—	—	—	—	10,000	—	—
Elongation, per cent	15–25	15–25	18–25	20–35	30	—	—
Bursting Strength (Mullen) lbs. per sq. in.	—	—	—	—	48	—	—
Tearing Strength (Elmendorf), grams	2–10[1]	2–10[1]	2–10[1]	2–5	7	—	—
Folding Endurance	—	—	—	—	4,000	—	—
CHEMICAL							
Water Absorption in 24-hr. Immersion Test, per cent	High	High	Low (water repellent)	3.5–8.0	2.6	Negligible	—
Moisture Vapor Permeability,[3] grams/24 hrs./100 sq. in. at 100 deg. F. 95% R. H.	High	0.2–0.6	0.2–0.6	High	High	High	High
Permeability to Gases	Moist: Low Dry: Impermeable	Immeasurable[2] Impermeable[3]	Immeasurable[2] Impermeable[3]	Low[2] Impermeable[3]	Depends on R. H.	—	—
Resistance to Acids	Poor resistance to strong acids	Poor resistance to strong acids	Poor resistance to strong acids	Poor	Weak and fair	Good	Good
Resistance to Alkalies	Poor resistance to strong alkalies	Poor resistance to strong alkalies	Poor resistance to strong alkalies	Poor	Excellent	Good	Good
Resistance to Greases and Oils	Impermeable	Impermeable	Impermeable	Good	Good	Good	Good
Resistance to Organic Solvents	Insoluble	Insoluble	Insoluble	Soluble, except in hydrocarbons	Soluble	Soluble in some	Soluble in some
PERMANENCE							
Resistance to Heat (Limiting Temp.), ° F.	Begins to char at 375° F.	Begins to char at 300° F.	Begins to char at 300° F.	150° F.	275° F.	Softens at 200° F., melts at 230–295° F.	180° F.
Resistance to Cold (Limiting Temp.), ° F.	Depends on type and R. H.	Depends on type and R. H.	Depends on type and R. H.		—75° F.	—	—40° F.
Resistance to Sunlight	No effect	No effect	No effect	Good	Excellent	No effect	Good
Dimensional Change at High R. H., per cent	3–5	3–5	3–5	Slight	Very slight	None	—
Resistance to Storage	Deterioration due to age is negligible, provided proper storage conditions are maintained			Good	Excellent	No change	Good
Flammability	Same as newsprint	Same as newsprint	Same as newsprint	Nonflammable	Moderate	Slow burning	Slow burning
Manufacturers	E. I. du Pont de Nemours & Co., Inc. Sylvania Industrial Corporation			E. I. du Pont de Nemours & Co. Inc. Celanese Celluloid Corp. American Products Mfg. Co. Tennessee Eastman Corp.	Dow Chemical Co.	B. F. Goodrich Co. Carbide & Carbon Chemicals Corp. Goodyear Tire & Rubber Co.	

PROPERTIES	PAPER PRODUCTS

S OF FLEXIBLE PACKAGING MATERIALS

lieved to represent acceptable commercial standards. Special grades of some of these materials may be obtained which excel in s
r for new uses of their materials. Because of wartime restrictions, some of the materials listed in the chart may not be available

		VINYL RESINS			RUBBER BASE PRODUC	
e	Ethyl Cellulose	Vinyl Films Vinyl Chloride or Vinyl Cl and Ac.[4]	Vinyl-Coated Paper[4]	Saran	Pliofilm	
	Ethyl cellulose	Vinyl resins	Vinyl resins on paper	Polyvinylidene chloride	Rubber Hydrochloride	La fo
	Sheets & rolls	Rolls	Rolls	Seamless tubes, rolls	Continuous rolls & sheets	Un E
	Transparent to opaque	Transparent to translucent	Opaque	Transparent	Transparent to opaque	T
	0.001–.020	0.001 or more	Resin 0.001 or more	0.00125–0.00225	Normal 0.0003–0.00225 Tensilized 0.0002–0.0004	Unexp Expa
	25	40	40	24	48	For
	24,300 or less	2,300 or less	—	7,200 — 13,000	24,000 or less	
	1.14	1.14	1.40	1.68	1.12–1.15	
	10,000	—	—	7,000–11,000	Yield 2,800–4,000 Ultimate 5,500–7,500	1 (e
	30	—	—	25–35	Yield 10–20 Ultimate 350–500	
	48	—	—	67	—	
	7	—	—	40	—	
	4,000	—	—	Over 500,000	10,000–1,000,000 (M. I. T.)	
	2.6	Negligible	—	None	0.6–1.3 at 75% R. H.	
	High	High	High	0.20 or less	0.5–1.0	
	Depends on R. H.	—	—	Very low	6–85 cc. of air/100 sq. in./ 100 hr. at 100° F. & 760 mm. 100–1,500 cc. of CO_2/100 sq. in./ 100 hr. at 100° F. & 760 mm.	Perme ligible
	Weak and fair	Good	Good	Excellent, except H_2SO_4 and HNO_3	Good	
	Excellent	Good	Good	Good except NH_4OH	Good	
	Good	Good	Good	Excellent	Good	Excel
n	Soluble	Soluble in some	Soluble in some	Good	Soluble in aromatic & chlorinated hydrocarbons	So alc
	275° F.	Softens at 200° F., melts at 230–295° F.	180° F.	170° F.	160° F.	Heat bag t
	—75° F.	—	—40° F.	—20° F.	—50° F.	
	Excellent	No effect	Good	Excellent	Fair	
	Very slight	None	—	None	Slight	
	Excellent	No change	Good	Good	Good if kept in dark	Excel
	Moderate	Slow burning	Slow burning	Self-extinguishing	Slow burning	S
c. id ts an	Dow Chemical Co.	B. F. Goodrich Co. Carbide & Carbon Chemicals Corp. Goodyear Tire & Rubber Co.		Dow Chemical Co.	Goodyear Tire & Rubber Co., Inc.	D

ich excel in some particular property.

be available for all purposes.

SE PRODUCTS	WAX BASE PRODUCTS	
Cry-O-Vac	Parakote	Paraply
Latex film used for frozen foods	Wax & film formers coated on paper & foils	Wax & film formers between papers
Unexpanded bags Expanded bags	Continuous rolls & sheets	Continuous rolls & sheets
Transparent	Translucent to opaque	Translucent to opaque
Unexpanded 0.018–0.020 Expanded 0.0015–0.002	0.002–0.030	0.004–0.030
For 1-lb. to 400-lb. packages	36	55
—	—	—
0.935	—	—
15,000 at 40° F. (expanded film)	—	—
1,200	—	—
—	—	—
—	—	—
—	—	—
Negligible	—	—
Very low	0.3–1.0	0.2–1.0
Permeable to CO_2; negligible to other common gases	Low to high	Low to high
Good	—	—
Good	—	—
Excellent below 30° F.	Fair to good	Fair to good
Soluble except in alcohols, ketones and ethers	Soluble in some aromatic & aliphatic hydrocarbons	Soluble in some aromatic & aliphatic hydrocarbons
Heat shrinks expanded bag to size of package	—	—
—50° F.	—	—
—	—	—
Negligible	—	—
Excellent at 40° F. and below	—	—
Slow burning	—	—
Dewey & Almy Chemical Co.	Menasha Products Co.	

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	Vegetable Parchment	Wet-Strength Paper	Plain Glassine	Lacquered Glassine	Waxed Glassine	Laminated Glas
GENERAL						
Type of Material	Chemically treated paper	Paper with added resins	Physically treated paper	Coated physically treated paper	Coated physically treated paper	2-Ply physically t paper
Forms Available	Sheets & rolls, many weights & grades	Sheets & rolls	Sheets, continuous rolls & converted products	Sheets, continuous rolls & converted products	Sheets, continuous rolls & converted products	Sheets & continu rolls
Clarity	Translucent to opaque	Opaque	Near transparency to translucency & opaque	Transparent and opaque	Nearly transparent and opaque	Translucent and o
Thickness Range, in.	0.0017–0.0055	0.0025–0.0070	0.00075–0.003	0.0008–0.002	0.0008–0.003	0.002 and up
Maximum Width, in.	90	88	70	52	70	52
Area Factor, sq. in. per lb.	6,200–21,600	14,400 and up	7,200–34,000	9,600–20,600	6,600–28,800	9,500 and less
Specific Gravity, approximate	—	—	—	—	—	—
MECHANICAL						
Tensile Strength, lbs. per sq. in.	High wet strength	High wet strength	—	—	—	—
Elongation, per cent	—	—	—	—	—	—
Bursting Strength (Mullen) lbs. per sq. in.	13–65	(Dry) 80% of basis weight (Wet) 30–60% of dry test	10–50	10–25	8–40	26 and up
Tearing Strength (Elmendorf), grams	14–76	35–50 and up	6–40	6–20	5–38	20 and up
Folding Endurance	High	—	—	—	—	—
CHEMICAL						
Water Absorption in 24-hr. Immersion Test, per cent	High, but insoluble	High, but insoluble	Medium	Moderate	Very low	Medium
Moisture VaporPermeability,[3] grams/24 hrs./100 sq. in. at 100 deg. F. 95% R. H.	High	High	High	0.2–1.0	0.2–1.0	0.2–1.0
Permeability to Gases	Permeable	Permeable	Low	Low	Low	Low
Resistance to Acids	Dilute: good	Fair	Moderate	Moderate	Moderate	Moderate
Resistance to Alkalies	Dilute: good	Poor	Poor	Good	Good	Poor
Resistance to Greases and Oils	Fair to excellent; insoluble	Poor	Good	Good	Excellent	Excellent
Resistance to Organic Solvents	—	Absorbs	Good	Poor	Good	Good
PERMANENCE						
Resistance to Heat (Limiting Temp.), ° F.	200° F. dry; any temp. wet	200° F. dry; any temp. wet	150–240° F.	150–300° F.	Heat sealing	130–150° F.
Resistance to Cold (Limiting Temp.), ° F.	—	Good	—20° F.	—20° F.	—20° F.	Depends on plastici
Resistance to Sunlight	Good	Good	Good	Good	Good	Good
Dimensional Change at High R. H., per cent	Expands, stretches	Considerably less than ordinary paper	Slight	Slight	Slight	Slight
Resistance to Storage	Good	Good	Good	Good	Good	Good
Flammability	Similar to paper	Similar to paper	Similar to paper	Inflammable	Inflammable	Inflammable
Manufacturers	Kalamazoo Vegetable Parchment Co. Paterson Parchment Co.	Can be made by any paper mill	Brownville Paper Co. Deerfield Glassine Co. Glassine Paper Co. Hamersley Mfg. Co. Hartford City Paper Co. Mountain Mill Corp. Nicolet Paper Corp. Oregon Pulp & Paper Co. Rhinelander Paper Co. Riegel Paper Corp. Thilmany Pulp & Paper Co. Westfield River Paper Co.	Hartford City Paper Co. Hazen Paper Co. Rhinelander Paper Co. Riegel Paper Corp. Westfield River Paper Co.	Deerfield Glassine Co. Glassine Paper Co. Oregon Pulp & Paper Co. Hamersley Mfg. Co. Rhinelander Paper Co. Riegel Paper Corp. Thilmany Pulp & Paper Co. Westfield River Paper Co.	Deerfield Glassine Co. Glassine Paper Co. Hamersley Mfg. Co. Hazen Paper Co. Rhinelander Paper Co Riegel Paper Corp. Thilmany Pulp & Pa Co. Westfield River Paper

[1] Figures represent pull required to continue tear after starting. Force required to start tear is too high to measure on same equipment and therefore is not normally determined.
[2] Using $CaCl_2$ in Test Dish; method is described in ANC67 Army-Navy Specification.
[3] Depends on amount of moisture present, solubility of gas in water, moisture vaporproofness of film, and vapor pressure differential.
[4] Vinyl chloride or chloride-acetate polymers, either formed or applied from solvent solutions or by calendering hot fluid resin.
[5] Waxy laminant.
[6] Asphaltic laminant.

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uered Glassine	Waxed Glassine	Laminated Glassine[5]	Laminated Glassine[5]	Plain Greaseproof	
ted physically eated paper	Coated physically treated paper	2-Ply physically treated paper	3-Ply physically treated paper	Mechanical parchment	
continuous rolls verted products	Sheets, continuous rolls & converted products	Sheets & continuous rolls	Sheets, rolls	Sheets, continuous rolls & converted products	
rent and opaque	Nearly transparent and opaque	Translucent and opaque	Translucent to opaque	Translucent and opaque	
.0008–0.002	0.0008–0.003	0.002 and up	0.003 or more	0.001–0.004	
52	70	52	52	160	
,600–20,600	6,600–28,800	9,500 and less	6,200 or less	7,200–25,400	
—	—	—	—	—	
—	—	—	—	—	
—	—	—	—	—	
10–25	8–40	26 and up	40 or more	10–60	
6–20	5–38	20 and up	30 or more	8–45	2
—	—	—	—	—	1
Moderate	Very low	Medium	Medium	High	
0.2–1.0	0.2–1.0	0.2–1.0	0.1–0.2	High	
Low	Low	Low	Very low	Moderate	
Moderate	Moderate	Moderate	Moderate	Good	
Good	Good	Poor	Poor	Poor	
Good	Excellent	Excellent	Excellent	Good	
Poor	Good	Good	Good	Good	
50–300° F.	Heat sealing	130–150° F.	130–150° F.	150–240° F.	
—20° F.	—20° F.	Depends on plasticizer	Depends on plasticizer	—20° F.	
Good	Good	Good	Good	Good	
Slight	Slight	Slight	Slight	Slight	
Good	Good	Good	Good	Good	
flammable	Inflammable	Inflammable	Inflammable	Similar to paper	
d City Paper Co. Paper Co. nder Paper Co. Paper Corp. d River Paper Co.	Deerfield Glassine Co. Glassine Paper Co. Oregon Pulp & Paper Co. Hamersley Mfg. Co. Rhinelander Paper Co. Riegel Paper Corp. Thilmany Pulp & Paper Co. Westfield River Paper Co.	Deerfield Glassine Co. Glassine Paper Co. Hamersley Mfg. Co. Hazen Paper Co. Rhinelander Paper Co. Riegel Paper Corp. Thilmany Pulp & Paper Co. Westfield River Paper Co.	Glassine Paper Co Riegel Paper Corp. Rhineland Paper Co. Westfield River Paper Co.	Deerfield Glassine Co. Glassine Paper Co. Hamersley Mfg. Co. Hartford City Paper Co. Kalamazoo Vegetable Parchment Co. Nicolet Paper Corp. Oregon Pulp & Paper Co. Rhinelander Paper Co. Riegel Paper Corp. Thilmany Pulp & Paper Co.	

herefore is not normally determined.

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	Kraft Paper	Laminated Kraft[8]
	—	Laminated kraft paper for liners
	Rolls & sheets	Rolls & sheets
	Opaque	Opaque
	0.002–0.009	—
	80	40
	4,600–16,600	4,150–5,200
	0.65	—
	35% of basic wt.	—
	2–5	—
	80% of basic wt.	50–60
	2 pts. per lb. of basic wt.	—
	10 double (Schopper)	—
	High	High
	High	1 to 5
	Permeable	Permeable
	Poor	Poor
	Poor	Poor
	Poor	Poor
	Not resistant	Poor
	200° F.	150° F.
	—	Good
	Colors will fade	Excellent
	M. D. approx. 0.5% C. D. approx. 1.5%	Considerable
	Avoid dampness, high heat, & low humidity	Good
	Burns readily	Burns readily

Thilmany Pulp & Paper Co.
Union Bag & Paper Corp.

XUM

Printed transparent sheeting

Novelty of the material alone was enough to assure the sales appeal of articles wrapped in transparent sheeting when these packaging materials were first introduced. With lower costs and wider applications, more was learned about their sales-stimulating powers. However, when two or more similar products were competing in the same outlets in transparent packages, the need for distinctive appearance and an effective sales story became apparent. That is where the importance of printing on these materials came in.

In industry after industry, this cycle was repeated. The use of sheet wraps or bags was followed by beautifully printed wraps or bags. Even on mass market, in the case of cheap, daily purchase items like bread, a growing trend was apparent toward the use of printed transparent wrappers—this in spite of higher costs than those involved with an unprinted wrap and a printed, waxed paper band label. The printing in this case increased display value in the store, made the loaf recognizable, even if only one end was visible on the bread display rack, and offered an ample opportunity to feature the brand name and dietetic advantages on each and every wrapper. Generally, its use was restricted to specialty loaves made of ingredients which commanded a higher market price than the standard white bread. The printed wrapper set the loaf out from its cheap competition even though the bread itself did not actually look any different.

Cranberries packed in printed transparent bags commanded a higher market and retail price, more than absorbing increased packing costs. The package protected the berries, giving them a longer display life, permitting convenient display throughout the grocery store and carrying the brand name into the home. The printed transparent bag converted a bulk, unbranded food into a fast selling, profitable specialty. Similar marketing revolutions have been put over with fresh tomatoes, machine-wrapped imprinted roll film over open-top folding boxes and with dried beans, packed in printed transparent bags and shipped over wide areas; both carrying the packer's trademark into the home and assuring the housewife of uniform high quality and sanitation.

The possibility of creating and reproducing highly artistic colorful designs on transparent films, should not blind us to the prosaic but highly successful performance of simple one- or two-color printing jobs on these materials. As new films become available after the war, we can predict the rapid development of printed applications.

In creating designs for transparent packages, the product itself becomes the background. This and other problems suggest the advisability of checking the design problem with the film converter early in the game. His design staff may suggest effective ideas which will improve sales appeal without imposing additional manufacturing problems. For example, "hit or miss" designs may be as effective as registered designs in a particular application, and they may reduce costs and the need for electric-eye control on wrapping machines.

The technical problems of printing have been solved in the past. We can be equally confident that the new ones imposed by new films will be answered as well just as soon as the manpower, equipment and chemicals required are released from war's demands.

In the order of their development, there are three major processes of printing on transparent sheeting. These are:

1. Letterpress, which employs relief engravings and oil inks
2. Gravure, in which impressions are made from etched cylinders with lacquer inks
3. Aniline, using spirit inks and, usually, rubber printing plates

(Continued on next page)

1—Swim suits are displayed in a waterproof transparent printed bag which is a good re-use container. Photo, Goodyear Tire & Rubber Co.

1



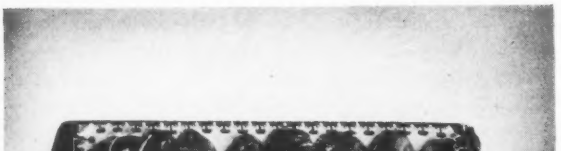
2—These transparent shirt wraps speak for themselves while they guard merchandise against soil from handling. Photo, Traver Corp.

2





3



4



5

3—Eye catcher is this black printed cellophane envelope with transparent portion which gives information about grade and color of product. Photo, Miprint, Inc. 4—Picturesqueness of place of origin is brought home in the printed design on this transparent package of dates. Photo, Venus Packing Co. 5—Holiday appeal is imparted to work-a-day products by these printed cellophane wrappers. Photo, The Dobeckmun Co.

Which of these processes would be most satisfactory for the case at hand depends upon:

1. The art work—Most designs can be printed in any one of the three processes with striking results. However, art work involving fine halftone screen, soft tone work or color should be printed in gravure.
2. The nature of product—Certain products contain chemicals either inherent or added by processing which may attack the inks. For example, oil of wintergreen used in confections, such as mints, attacks certain aniline ink colors, whereas letterpress or gravure inks remain fast and, in the main, inert. Packages for fruits processed with sulphur dioxide often employ the use of a protective metallic ink as a base for other colors.
3. The type of film used—While the type of film does not limit printing to any one of the three processes, the nature of the product and its handling in production and in the finished package form should be carefully considered when the film and the type of printing are selected.

Letterpress printing

This is the best known of all printing methods and is the one by which the first successful printing on transparent cellulose was accomplished. However, due to the temperamental nature of the film, really successful commercial production was not attained until roll-fed presses were employed. These required the addition of many devices, such as means of continuous control of the web or sheet during the printing operation, to ensure registered printing of successive colors. Several types of roll-fed presses are presently in use. In some types, a number of printing or plate cylinders are arranged around a central platen cylinder and the printing is done on a continuous web, which is then delivered in the form of either sheets or rolls. Other types of presses cut the sheet to a predetermined size before the printing impression is made.

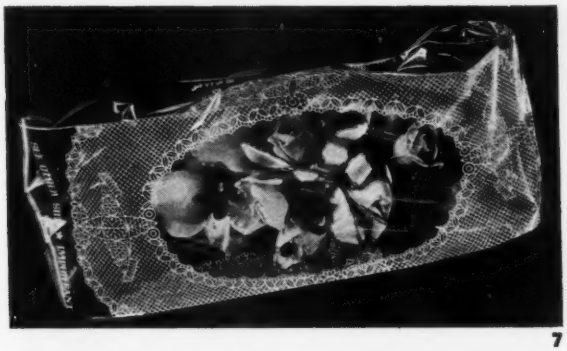
Letterpress printing may be done on either surface of the cellulose film and, where it is not objectionable for the printed side to come in contact with the product to be packaged, the use of reverse or underside printing permits the retention of the full gloss, or sheen, of the cellulose, thus enhancing and vivifying the colors of the inks. Letterpress printing is also employed almost exclusively where the printed cellulose is to be used on moist or greasy objects, as, for example, on meat or fish products.

Gravure printing

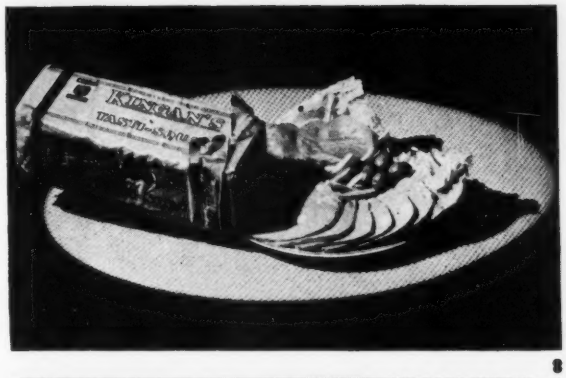
This process came into use only after letterpress printing on transparent cellulose had become fairly well standardized and its limitations had been explored. The inks used are of the fast drying, lacquer type, which not only eliminate the use of slip-sheets, but permit the printer to obtain a degree of opacity impossible with oil inks, as well as to print color upon color in a continuous operation. The pigments used in gravure inks permit,



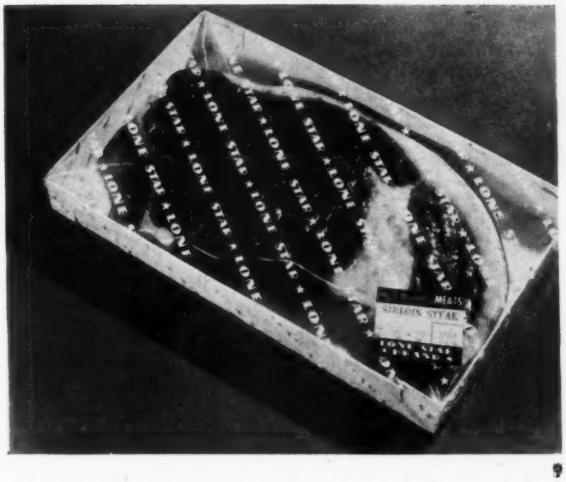
6



7



8



9

6—Clear view of product, appeal of message, tempts trying new items packaged like this. Photo, E. I. du Pont de Nemours & Co., Inc. 7—The natural beauty of a corsage is enhanced by design on wrap. Photo, Dobeckmun Co. 8—Rubber hydro-chloride sheet, printed, will be back to protect civilian goods. Photo, Goodyear Tire & Rubber Co. 9—Postwar meat package. Photo, E. I. du Pont de Nemours & Co., Inc.

also, the obtaining of very brilliant full colors and shades.

Since gravure printing can only be done through the use of intaglio-etched cylinders, the cost of engravings for this process is relatively higher than for either letterpress or aniline printing. The combination of more than one design on a set of cylinders is impossible, unless all of the designs can be executed within the limit of the number of colors available on the press, and unless each design, in repeat runs, can be produced at the same time and in the same proportion as to quantity as the original run. At present, presses are available where as many as 7 colors may be produced at a single run.

The gravure method produces the highest type of printing available at present on transparent cellulose, and particularly attractive effects are obtained through the use of reverse printing. Halftones can be satisfactorily reproduced, provided the tone work can be underlaid with a neutral color, such as white. Gravure printing is not recommended for use where the product to be packaged is greasy or has a high moisture content.

Aniline printing

This type of printing is among the most recent to be used for transparent cellulose. Because it generally employs rubber, rather than metal printing plates, and because it employs fast drying inks, eliminating the necessity for slip-sheeting, it was originally hailed as a means of producing printed cellulose more economically than the older processes. However, the limitations of the process and inks originally employed made aniline printing less satisfactory from the standpoint of package appearance and users of printed cellulose were loath to adopt it, even at somewhat lower costs. Since aniline printing was originally introduced, much progress has been made, notably just before the war, in improving the results obtained and some highly creditable work had already been done by this process. Naturally, this has involved the use of more expensive materials and equipment. The cost of aniline printing today is probably on a par with that of letterpress.

Tone work in aniline printing is possible only to a very limited extent and its use on moist or greasy products, particularly foods, is somewhat questionable. It does give excellent opacity, brilliant colors and, particularly in surface printing, a lustre that is superior to that of either letterpress or gravure.

The development of methods of printing transparent film in continuous rolls has contributed largely to the expanded use of such wrappers in mechanical packaging. Starting with the wrapping of bread, this application has spread into many fields. Controlled cut-offs, made possible by the use of photo-electric cells, permit "spot"



10

10—*Printed cellophane makes an inexpensive yet effective package for low-cost grocery products. Photo, E. I. du Pont de Nemours & Co., Inc.*

wrapping the printed film on cartons or open-faced trays, in addition to permitting the use of printed transparent rolls on automatic machines.

General information

Tints—Both gravure and aniline inks may be used in producing tints on transparent cellulose. A wide range of colors is available and the tints do not impair the gloss of the film. They alter its transparency only as the color of the tint reacts on the color of the product packaged. Letterpress tints are generally unsatisfactory.

Opacity—As mentioned in preceding paragraphs, gravure and pigmented aniline inks produce impressions of greater opacity than letterpress, although the latter gives a degree of opacity suitable for many purposes.

Metallics—The gravure process is pre-eminent for printing metallics. Brilliance or opacity can be obtained with a single impression, although two layers of color may be employed where extreme opacity is desired. Letterpress metallics are very satisfactory in surface printing, where the metallic may be underlaid with a sizing, as of yellow in the case of gold, or white in the case of silver. Where reverse printing is employed, letterpress metallics cannot be underlaid and are correspondingly lacking in opacity. Satisfactory metallics for aniline production have not as yet been developed.

Reverse printing—All three printing processes may be employed to produce reverse printing, although letterpress is inferior to either gravure or aniline for this purpose, except where solid lays of full color are used.

Register—Where fine register is required, the letterpress process is superior to either of the others. The use of metallic plates, giving sharp, controllable register, permits the production of effects not possible with either gravure or aniline. Where the design is such that color may be superimposed on color, register often is of negligible account in gravure or aniline work.

Tone or screen work—Bendays and halftones are well within the range of most good producers of letterpress printing on transparent cellulose. Halftone work is possible to a considerable degree in gravure, with a range of benday screens or stipple effects also available.

With the amount and character of the research now going forward in the field of cellulose printing, it is not too much to expect that four-color process work will eventually be done on this material.

Package forms

Printed transparent cellulose is available in a variety of forms, the better-known of which are listed below:

Sheets—These are available in any type of film, printed in from one to seven colors, in practically any size.

Rolls—Continuous printed rolls of any type of film are obtainable in widths ranging from 1/4 in. to 36 in., printed in as many as 7 colors. Printed designs may be continuous or may be spot-registered for use on automatic packaging machines, where the printed design is accurately located on the package by means of a photo-electric cell device.

Bags—Single- or double-wall bags of transparent cellulose, printed in 7 colors or less, are available in flat, square and satchel bottom styles. Nearly all types of film may be employed in their construction. Sizes range from very small bags, in the flat type, up to 10 in. by 18 in. in the satchel bottom style.

Envelopes—Both die-cut and roll-cut styles are available in a wide range of sizes with either side or end openings and with printing in any number of colors up to seven. Most types of transparent cellulose can now be successfully fabricated into envelopes.

Specialty packages—Tubes for cigars and other slender objects, such as tooth brushes, are available, printed in as many as 7 colors and in most types of film. Other packages, combining printed cellulose faces with backs or affixed pieces of board or other material, may also be had. Sheets or rolls of printed cellulose, affixed at one or both sides to corresponding sheets or rolls of foil, glassine and other materials, are available. Other types of packages employ sheets or rolls of printed cellulose in combination with folding cartons or with fibre plates or trays; in some instances, such combination packages are supplied with retaining rings or other parts to make a complete package.

Laminated printed cellulose—For the purpose of this article, it may be said that printed cellulose, laminated to a variety of base materials, is available in sheets, rolls, specific types of bags and folding cartons.

Window-faced wraps—These have been developed essentially as a means of combining the advantages of opaque and transparent materials for wrapping purposes. They are formed by passing together continuous alternate strips of paper and transparent film. In most instances, moistureproof cellulose and greaseproof glassines are combined and widely used in the baking industry.

Glassines

by F. S. Leinbach[1]

Because plain, wax-coated and laminated glassines have always been used very largely for protective rather than for decorative purposes, U. S. Government restrictions prohibiting their use for non-essential products do not materially alter the situation regarding their availability to packagers.

Their essential protective qualities are borne out by the fact that over 90 per cent of the various glassines have been used in the food field.

Glassine is the densest, most compact form of paper. It is made of exceedingly small fibres that are "hydrated" —that is, water is driven into their cellular structure until they have become nearly gelatinous. After the paper is formed on the machine, it is supercalendered. Under the terrific pressure and heat on the hydrated cellulose, the paper becomes smooth and quite transparent. It is then glassine. If the supercalendering is omitted, the paper is neither smooth nor transparent, but the other inherent qualities are there. This is termed greaseproof paper.

Because since the specially prepared fibres of glassine and greaseproof form without the porosity that usually characterizes paper, and because cellulose itself is grease-resistant, these papers are highly resistant to the passage of oils, fats and greases. The degree of resistance is usually measured by the number of seconds a paper can withstand penetration by turpentine.

[1] The author wishes to express his appreciation for the assistance and the guidance of the Technical Committee of the Glassine and Greaseproof Manufacturers Association in the revision of this article.

Properties of glassine

The close-knit structure and the hydrated condition of their cellulose enable these papers to resist transmission of flavor and aromas. Thus they maintain inherent flavors and aromas within a package and exclude any that might be contaminating. They also are quite gasproof among papers, particularly against hydrocarbon vapors. Untreated, however, they are neither waterproof nor moistureproof. These qualities, particularly the latter, must be attained by a surface treatment with paraffin wax, or a mixture containing some percentage of that material. The smooth, non-porous, non-absorbent surface of glassine is ideal for wax-coating, lacquering or laminating, and much of the glassine manufactured receives one of these treatments. It is waxed to make it water-vaporproof, more transparent and glossy, and to assure adequate heat-sealing. It is laminated to produce a water-vaporproof sheet, while, at the same time, the lamination produces a paper that is softer and stronger than a single sheet of the same weight. Glassine is lacquered to make it more transparent and glossy, repellent to water-vapor and water, and to assure its making a good heat-seal. The coating also enhances the original greaseproof, gasproof and flavor-retaining properties of these versatile packaging materials.

Glassines may be embossed for decorative purposes. The recent discovery of "deadness," or the ability of a soft glassine to hold folds, has brought out many new applications of embossing. All glassines and glassine deriva-

PROPERTIES OF GLASSINE AND GREASEPROOF PAPERS

	Greaseproof papers	*Glassine papers*	*Waxed glassine*	*Laminated glassine*	*Lacquered glassine*
GENERAL PROTECTIVE FUNCTIONS					
GREASEPROOFNESS	Yes	Yes	Yes	Yes	Yes
FLAVOR RETENTION	Yes	Yes	Yes	Yes	Yes
WET STRENGTH	Available	Available	Available	Available	Available
* RESISTANCE TO GAS TRANSMISSION	Fair	Fair	Good	Good	Good
WATER VAPORPROOFNESS	No	No	Yes	Yes	Yes
GENERAL PACKAGE FORMING QUALITIES					
PLIABILITY, SOFTNESS	Yes—in plasticized grades	Yes—in plasticized grades	Yes—in plasticized grades	Excellent	Yes—in plasticized grades
GLUE SEAL	Required	Required	Can be used	Required	Can be used
HEAT SEAL	No	No	Yes but of limited strength	No	Yes, very positive
GENERAL ADAPTABILITY TO VISUAL FUNCTIONS					
TRANSPARENCY	No	Satisfactory	Good	Fair	Good
SMOOTH SURFACE	No	Yes	Yes	Yes	Yes
HIGH GLOSS SURFACE	No	No	Yes, but will smudge	No	Yes
GLOSS PRINTING AVAILABLE	No, but prints well	Yes	Yes	Yes	Yes
COLORS, TRANSPARENT	No	Yes	Yes	Yes	Yes
COLORS, OPAQUE	Yes	Yes	Yes	Yes	Yes

* See MODERN PACKAGING, July 1943, L. W. Elder, "Permeability of Flexible Materials."



1

tives can be printed by using any one of several available methods.

In glassine the weight of 500 sheets, 24 by 36 in., is taken as "basis weight." Thus, "25-lb. paper" means that twenty-five pounds of paper will cover the area of this much paper, 432,000 sq. in. In single sheets, a ream of paper weighs 20—40 lb.; laminated glassines may weigh 45—90 lb.

The weight of 1,000 sheets in any given size which is needed for a package is calculated by the following formula:

$$\frac{\text{length} \times \text{width} \times \text{basis weight}}{432}$$

Length and width are in inches, and basis weight is in

2



1—*Many hygroscopic products packaged in fibre cans, cartons and envelopes are protected by laminated glassine. Photo, Riegel Paper Co.*

pounds. The figure obtained here, multiplied by the price of a pound, shows the cost of 1,000 packages.

Types of glassine

There are many variations of glassine and its derivatives: for strength and economy, the unbleached or lightly bleached amber types are used. There are also the opaque, pigmented whites, and the clear and colored transparencies. Each mill has standard colors which it either stocks or runs from time to time so that smaller lots will be available. Ordinarily the massive proportions of a paper machine require that special colors and grades be made in fairly large minimum quantities for the sake of economy—usually five tons.

The properties of these papers read like the language of packaging—impermeable, greaseproof, water-vaporproof, gasproof, flavor-and-aroma-retentive, mechanically operative, transparent, easy to heat-seal, economical, etc. These are qualities so fundamental that each year glassine finds new uses. Recently products that might have suffered from the shortage of materials have found the protection they need in glassine and its derivatives. The sales of these packages vouch for their appearance as well as their protective value.

Wet-strength glassine, i.e., glassine which has all the normally inherent qualities of its kind, but which, in addition, retains a great deal of its physical strength even after long submersion in water, is one of the most notable of the recent developments in this field. Wet-strength glassines can be waxed, laminated, lacquered or given combinations of these treatments, just the same as the usual varieties. This, of course, brings an entire series of new products to the package maker.

The importance of papers which combines the qualities of wet-strength and greaseproofness, wet-strength and water-vaporproofness, etc., is obvious to anyone wishing to package meat and dairy products, frozen foods and many other commodities. Laminated wet-strength glassine already plays an important role as a liner for bags used in packaging frozen vegetables.

Glassine used in cartons

For food products containing oil, such as the shortening in crackers or biscuits, papers can be used in several ways. In one system, a sheet of greaseproof paper—or, for better protection, waxed glassine—is interfolded by machinery as it sets up the carton. For further protection, the carton is then wrapped with some type of waterproof material.

Many such packages are made by equipment that sets up the carton and the liner independently, so that the side folds of the liner are heat-sealed for positive closure; after the package is filled, this type of liner may be closed by either the patented heat-seal closure or the very

2—*The bag of the White Rose tea package is formed of glassine. Same material appears as the protective wrap for a variety of candies.*

3—*Triple-ply laminated glassine pouch protects dehydrated cranberries against moisture with minimum equipment. Photo, Shellmar Products Co.*

efficient double-fold closure developed by several machine companies. Unless the product needs unusual protection, a package of this type generally does not carry an outer wrap, for waxed glassines are the most water-vaporproof form of waxed paper. Glassine is advisable in these packages not only because it maintains the original quality of the product, but also because it allows the use of a less carefully made carton stock and printing inks which might contaminate the product through another type of liner. The liner also prevents the grease of the product from staining the carton and it further helps to minimize rancidity.

The same general type has found wide acceptance in packaging cereals, brown sugar and other products where moisture-vaporproofness and protection of flavor and aroma are of paramount importance. The waxed liner allows reclosure of the package to protect the unused portion of the contents. Greaseproof paper and glassine are often laminated to paperboard to produce greaseproof carton stock of good moistureproofness.

If the product is such that contact with wax is not desirable, a liner can be made from laminated glassine. One type of machine places the liner directly from rolls of paper and closes it with glued seams. Another inserts prefabricated bags as the carton liner. These bags can be obtained with an imprint at the top, allowing for a heat-seal closure. Several soup mixtures and dessert powders are packaged in one of these types.

For some products, among them certain precooked cereals and dough mixtures which do not require moisture-vaporproofness, a plain, unwaxed glassine liner is used, with a folded closure and glued seams.

Special grades of glassine

Special grades of glassine are made sufficiently alkali-proof for many purposes; waxing their surfaces enhances this quality, and lacquered glassines are excellent in this respect. While no established soap manufacturers allow free alkali in their products, the lubricants used in molding the soap have an alkali effect on the wrapper if traces of them are carried on the soap. Therefore, the soap manufacturer finds in glassine derivatives a wrapper which successfully combines protection with long-lasting appearance.

The inherent greaseproofness of these papers and the ability of the mills to make them without harmful acid or alkaline materials (pH range, 6.5 to 7.5) enabled these papers to be among the first found suitable for packaging highly polished machine parts whose sensitive surfaces would otherwise be corroded by more acid or alkaline material. Less grease-resistant materials also would allow escape of the oils and greases that are applied to these parts as corrosion preventives.

The density and high dielectric strength of special



3

grades of glassine have made them extremely useful for electrical insulating purposes, particularly as the interleaving in special types of electrical condensers and in coil winding.

Surgical products, such as bandages and items for first aid, are hermetically sealed in glassine and then sterilized by heating at high temperature. The dense structure of this wrapper keeps the objects sterile for a longer period of time.

Many types of machines are available for wrapping

4



4—*Tea bags in cartons are given extra protection, assured of freshness when inner bag of glassine is provided. Photo, Deerfield Glassine Co.*



5

5—Though about 90 per cent of the glassine used in packaging protects foods, medical items such as the Band-Aid in cellulose glassine, have employed it to advantage. The Sunshine cracker tray and the Hershey cocoa container use glassine to make a greaseproof lined board, while the same material lines the fibre can for Nestle. Photo, Riegel Paper Co.

small items, particularly cakes, in waxed glassine, printed or plain. Spotting by electric eye is common, and the closures are heat sealed. The same machines handle lacquered glassines well. If printing or spotting is not desired, these machines will affix a label to this type of wrapper with a special glue. Small pies and similar products that must "breathe" are wrapped in unwaxed glassine, often prefabricated into different types of attractively printed bags.

A striking example of the industry's ability to "tailor-make" papers for specific uses is found in the economical printed and lacquered glassines widely used for packaging bread. Specifically developed to combine strength, good mechanical operating qualities, and excellent protection (flavor as well as moisture) with transparency, gloss, and brilliant coloring, these papers offer an opportunity for good individual designs.

Glassine as a wrapper, a liner, a covering for carton stocks, and often as an interleaf between layers, is of prime interest in packaging candy. Its greaseproof and flavor-retaining qualities preserve the package as well as the product.

Laminations and combinations

New and interesting products are found in combinations of glassine. One manufacturer finds excellent long-term protection in packages to be shipped to distant points when he wraps them with a waxed, laminated glassine. This combination offers unusual moisture-proofness, with all the inherent qualities of waxed glassine. Lacquered laminated glassines rank among the most highly water-vapor resistant packaging materials. That this type of paper has the ability to meet special requirements is shown in its highly successful use in special packages for frozen foods. Although they are sensitive to handling, several types of equipment can handle them well, and the protection they offer well rewards the care required. Machines are available which will use rolls of heat-sealing lacquered glassines automatically for heat-sealed bags.

The general technique of lamination has enabled paper processors to combine glassines and glassine derivatives with foils, plastic films, and other packaging materials. These combinations produce laminations in which the specific qualities of each ply are added to a total of outstanding packaging qualities.

Bags, often attractively printed, are obtainable in any of the greaseproofs, glassines and glassine derivatives. Because of this wealth of available combinations with glassines, the bag maker should always be consulted on packaging problems.

The versatility of protective glassine is shown by manufacturers who use various forms of it to replace metallic foil on candy, chewing gum, or small packages requiring superior protection, and on wrapping machinery that had been designed to take advantage of the folding characteristics of foil.

As the transparency used in "window" envelopes, glassine and lacquered glassine have long given outstanding service. While the visual functions of glassine and its derivatives must necessarily be secondary during wartimes, the package maker will find ample opportunity in this field for his postwar activities. Colorful printing upon glossy surfaces, with a choice of clear or colored transparency, white or colored opacity for a background, coupled with the protective functions that are needed to carry a product through storage and delivery, all are possibilities of direct advantage to the beautiful and appealing as well as to protective phases of packaging.

These and many other examples show that when working out a new package, wherever a problem of protection arises that may involve oils and greases, flavors and aromas, loss or gain of moisture, or contamination by vapor or bacteria after packaging, where mechanical operability is a factor, or transparency, heat-seal, or attractive printing are an advantage, full consideration should be given to glassine and its derivatives, and to the long experience of their manufacturers in solving of packaging problems.

Vegetable parchments

by J. R. Dufford

The discovery of vegetable parchment in 1853 came, like that of many other necessities of today, by accident. It has been attributed to W. E. Gaine, an Englishman, who is reputed to have prepared a sheet of cotton rag paper made by hand for use in demonstrating a lecture. While examining the sheet, it accidentally fell into a receptacle containing sulphuric acid. On recovering the sheet, much to his surprise, he found that the sheet of hand-made cotton rag paper had taken on an entirely new form. Instead of being a porous, absorbent and opaque sheet of paper, that which he held in his hand was translucent. By further experimenting he found that no amount of soaking in water, or even boiling, had any effect on the product of this happy accident.

At first Gaine's Paper, as it was called, was treated as a scientific curiosity, and its extraordinary properties were described before the Royal Society of London by Bailow in the year 1857. Several years elapsed, however, before vegetable parchment was produced on a commercial scale in a factory for hand-made paper established in London by Warren de Larue in 1861. Several years later it was produced also at Stowford Mills.

From these beginnings, the manufacture of vegetable parchment gradually spread throughout Europe. It was introduced in America in 1885 by Paterson Parchment Paper Company.

The preparation of vegetable parchment consists of two separate and distinct processes. The first is that of manufacturing the base paper called waterleaf. In order that the second process, that of parchmentizing, may be effectively conducted, it is necessary to exercise great care in the selection of raw materials entering into the waterleaf. Experience has shown that the purest cellulose produces the best results. Waterleaf for vegetable parchment differs from most papers in that it does not contain sizing or loading materials. Small quantities of either of these substances seriously impair the parchmentizing of the waterleaf to which they have been added. As the resultant finished vegetable parchment is in a large measure dependent upon the quality of the waterleaf, it is clear that the processing of the waterleaf requires every care.

For many years cotton rags constituted the principal raw material for waterleaf manufacture. However, with the advent of high alpha cellulose type pulps, this material almost completely supplanted cotton rags as a raw material for waterleaf manufacture. Special types produced which require a very high-grade cotton rag or a high-grade cotton linter are still produced. The beating, jordaning and other refining operations are accurately controlled and measured by various methods that have been found to give waterleaf of suitable quality.

Parchmentizing operation

The second process in the manufacture of vegetable parchment is that of parchmentizing. It is this process which renders the finished product so widely different from other papers. When properly prepared waterleaf is subjected to the action of sulphuric acid under suitably regulated conditions, a peculiar reaction occurs. It is

Editor's Note: Illustrations with this article show many prewar packages, some of which are not available under current restrictions. They serve to show trends in uses of vegetable parchment which will be resumed. All photos, Paterson Parchment Co.

1—Translucency of vegetable parchments is controlled in the parchmentizing process or by coating. Bausch & Lomb opacity rate is 45—60.

1



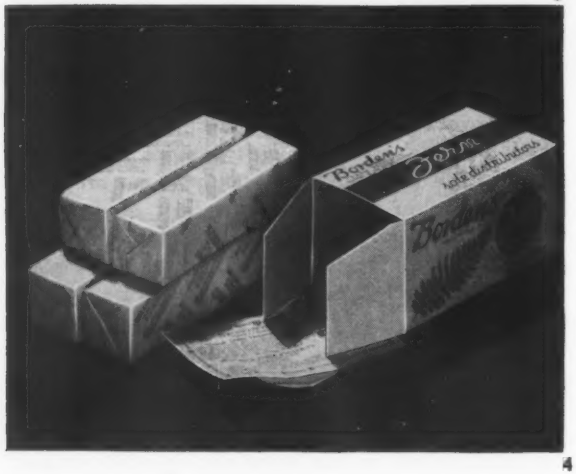
2—Vegetable parchment may be boiled for many hours without losing wet strength, a very important feature for packaging moist or wet foods.

2

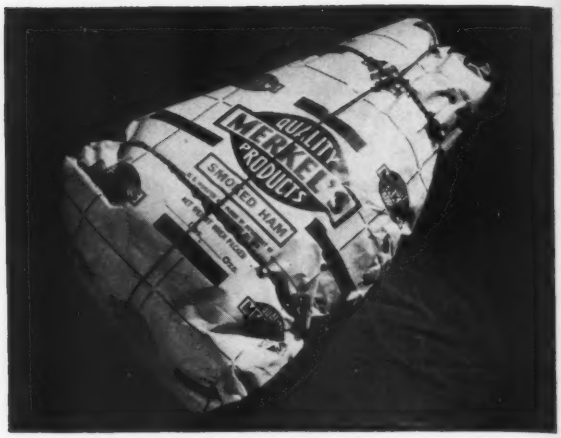




3



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5

3—Moist foods are wrapped in vegetable parchment which will not disintegrate in contact with water. Fish products are among the largest users of this material. 4—Because it resists the penetration of grease, vegetable parchment is ideal for wrapping butter. The familiar wrap employs a 30-lb. material. 5—Smoked ham contains 39½ per cent moisture, needs insoluble greaseproof wrapper. This is 40-lb. weight.

based on the power of sulphuric acid to convert cellulose into a gelatinous mass, which for the want of a better name is called amyloid. When waterleaf is exposed to the action of the acid, the fibres of the paper are attacked by the acid which forms a coating or film of gelatinous cellulose, covering the fibres and filling the interstices of the sheet, cementing or bonding the fibres together into a coherent mass, which subsequently is not defibered on immersion or even boiling in water.

It might also be noted that during the parchmentizing operation, opportunity is available to alter the normal condition of the paper as regards pH or acidity and also to apply a number of substances that have been found useful to incorporate with the paper for use in special cases. On leaving the parchmentizing machine, the paper passes through a paper machine dryer and here, too, may be incorporated size tubs and various additional apparatus which are found useful in the application of tub sizing for special papers. It is at these two points—the parchmentizing operation and at the dryers—that the basic changes in the characteristics of the paper are controlled. These steps have much to do with making possible the 179 types of vegetable parchment available for practically every packaging need.

Vegetable parchments of normal manufacture have a considerable weight and size range. Weights range from 25 to 120 lb. per ream (500 sheets, size 24 by 36). Huge rolls about 7 ft. wide and of endless length can furnish sizes and shapes for almost any purpose.

Vegetable parchment may be considered as practically pure cellulose in that the action of the acid has produced substantially only a swelling action on the cellulose, leaving no reaction products such as would occur in an ordinary double decomposition chemical reaction. It has an exceedingly low ash content, in the neighborhood of 0.1 of 1 per cent. Acidity is approximately 0.01 per cent as SO_2, although many papers have approximately one-third this acidity. The pH range is 5.5—7.0 for normal papers in the ordinary base weight range. The acidity and the pH, however, as we have pointed out before, can be altered by treatment with alkali or any suitable material during the parchmentizing operation, and here we have a considerable degree of flexibility. Residual salts exist merely as traces. Since the sheet does not contain other materials and because it is tasteless and odorless, it is particularly adapted as a wrapper coming into direct contact with foods.

Physical test data

As one might suppose, the physical characteristics of vegetable parchment may differ widely according to the use to which the finished product is to be put. For instance, one might parchmentize in a manner to sacrifice, let us say, Mullen, in order to bring out high tear characteristics, and vice versa. To continue along this same line, one might alter the parchmentizing in order to obtain maximum greaseproofness and with a resultant product having a lower tear and possibly a lower Mullen. Experience has shown that for normal vegetable parchment there is a balance between the physical tests of the paper compared to its greaseproofness. Wet Mullen test varies according to the type of parchment and is approximately 50—60 per cent of the dry Mullen values.

6—An inner 30-lb. wrapper for canned cheese protects the flavor, keeps contents from touching the metal and helps to prevent any discoloration. 7—Frozen food processors maintain high quality and help preserve food by using vegetable parchment. This is a 30-lb. wrap for frozen corn.

We find in the Elmendorf tear test that the sulphites range 60—80 per cent of the basis weight of the sheet, whereas the sulphates range 100—130 per cent of the basis weight of the sheet. In tensile strength, pound per inch width, the sulphites tested with the grain direction range 60—75 per cent on the above basis and across the grain direction from 30—40 per cent of the basis weight, whereas the sulphates show 90—105 per cent with the grain direction and across the grain direction 50—60 per cent. It should be pointed out here that as in the case of parchmentizing to obtain various degrees of greaseproofness of the sheet, considerable variation in the physical test of the sheet may be had by altering the procedure.

We find that stretch figures will vary considerably also. For instance, with the grain direction, figures indicate 2—4 per cent and across the grain direction approximately 4—15 per cent.

Functional properties

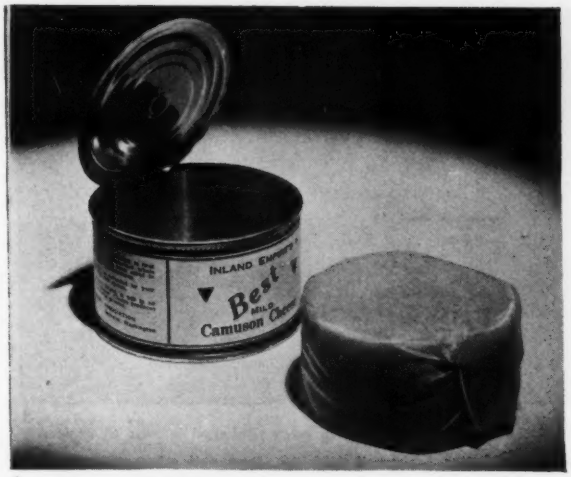
While vegetable parchment will not disintegrate in contact with moisture or water, it has a water-vapor transmission rate in direct proportion to the treatments used in processing. When manufactured for certain uses its W.V.T.R. has been reduced to a value of 1 and lower. Here again the purpose to which the parchment is to be put must be considered, and if W.V.T.R. is not important, regular types can be used. Where the W.V.T.R. is of prime importance, special coatings can be applied to obtain almost any desired result.

One of the outstanding properties of vegetable parchment is its resistance to penetration of grease. Vegetable parchment for the packaging of greasy substances such as butter, lard, shortenings, etc., is able to withstand the penetration of greases, oils and turpentine over a very long period. The type of parchment to be used depends upon the kind of product packaged. Average tests would not be of value, for the range of performance of some 179 types of vegetable parchment naturally vary so greatly that a discussion of this subject would be lengthy.

When vegetable parchment is of a sufficiently heavy weight, it is substantially impervious to the passage of air which enhances its value for many purposes.

Vegetable parchment wets readily with water and will absorb upwards of 100 per cent of its weight, but due to the very high degree of wet strength that it has due to the parchmentizing action, it will not disintegrate in contact with water. Vegetable parchment may be boiled for many hours without losing wet strength, and this is a very important feature in the packaging of moist or wet food products. It may also be boiled in weak alkaline solutions, saturated salt solutions, without losing its wet strength.

Vegetable parchment is translucent, and on the Bausch & Lomb opacity meter will read approximately 45—60. Here again, however, we have a fairly controllable variable in that the translucency of the parchment may be



6



7

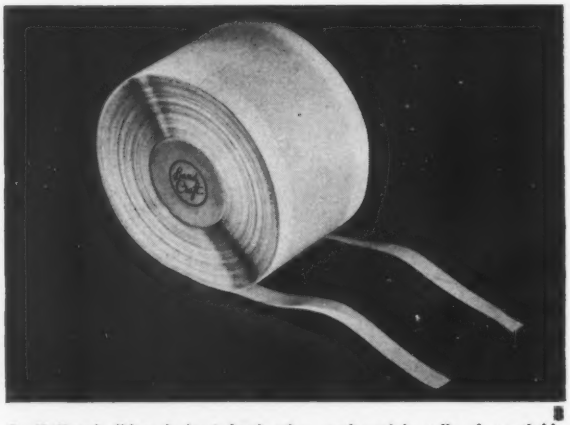
altered by the degree to which it is parchmentized, or by adding judicious amounts of opaque materials to the waterleaf, or by coating or sizing the parchment. The end use of the parchment would be the controlling factor.

The density or apparent specific gravity of vegetable parchment varies from about 0.78—0.95. The area in square feet per pound of parchment may be readily calculated by the following procedure:

$$\text{Area in sq. ft. per lb.} = \frac{3{,}000}{\text{Basis Wt.}} \quad (500 \text{ sheets } 24 \text{ by } 36)$$

Vegetable parchment, because of its inherent characteristics, high wet strength and the retention of this wet strength under very severe use conditions, and the fact that it is very grease and oil resistant, odorless and tasteless, is a very desirable paper for use in combination with other packaging materials. For example, lamination to transparent cellulose sheets, lamination to metal foils, etc.

Vegetable parchment varies in price according to type selected for the use to which it is to be put. It has always been in popular demand as its cost is low when compared with materials which give the same full packaging protection—i.e., wet strength and grease-resistance. Vegetable parchment can be beautifully printed in one to four colors with color-fast inks. The design of the wrapper is controlled purely by the imagination and ingenuity of the



8—*Hatband ribbon is kept fresh when packaged in rolls of vegetable parchment which protect it from oil stains and other types of soil.*



9—*Industrial packaging applications of vegetable parchment are increasing. Products coated with protective oil employ it successfully.*

artist who is entrusted with the creation of the package.

Vegetable parchment provides wrapper protection where its high strength, insolubility, resistance to disintegration and greaseproofness are essential. Coupled with the virtues of being odorless and tasteless, it has for many years been the almost indispensable wrapper for butter. These same characteristics have provided necessary protection for packaging of oleomargarine, lard and vegetable shortening; for wrapping of fresh and frozen fish and poultry, and fresh, smoked and processed meats.

Vegetables have provided wide opportunity for use of vegetable parchment as bands, wrapping and lining of iced and un-iced shipping containers.

Vegetable parchment has been combined with other materials where the inherent qualities of the material provide characteristics necessary for satisfactory and efficient packaging. Frequently, it has been employed as a supporting membrane for transparent films, foil and the like.

Vegetable parchment has been laminated to transparent cellulose films for the wrapping of cream cheese. Satisfactory performance is reported.

Laminated to itself, or to transparent cellulose films, it has occasionally been employed for lining the walls of fibreboard food containers.

A special type is used as gasket material on fibre oil containers. Combined with glassine, vegetable parchment was fabricated into C-ration packages.

Special types have been manufactured for use in the rubber industry as separators for unvulcanized or semi-vulcanized rubber, and for use on tire repair stocks, etc.

A special type of vegetable parchment has been in use for several years in the wool spinning industry, where it has proved itself valuable in the manufacture of wool yarns, replacing materials that formerly were imported and at the outbreak of the war became unavailable.

For more than 59 years the biggest job of vegetable parchment has been packaging and protecting foods. War needs resulted in a new appreciation of what this remarkable paper can do and today it has many important war assignments. Most of them cannot be talked about, but here are a few examples: In the manufacture of gas masks, in the manufacture of methyl methacrylate, mold liners, C-ration wrappers, map tracing papers, ointment box liners, snuff box liners, special photographic purposes, liners for coffee bags, bulk shortening package liners, liners for motor oil containers, and it has been used as a dialyzing membrane.

Because vegetable parchment is both insoluble and grease resisting, it is readily used as a liner for foods packed in cans. These liners keep the contents from touching the metal and prevent discoloration, thereby adding considerably to the sales appeal.

With the advent of the cold storage locker plant, a perfected type of this material has filled another need. The modern locker plant is interested in maintaining a high quality of service and as long a preservation of food and flavor as possible.

The medical profession uses vegetable parchment for wrapping surgical instruments and dressings to be sterilized in the autoclave. It takes scorching-hot live steam. It does not cause stain on the articles enclosed in it. Also, it can be easily marked to identify the article in the package without extra equipment.

In surgical operations sterilized vegetable parchment is used to protect tissues from injury from retractors. As a protective covering for wet dressings, it is an economical substitute for oiled silk or rubber. It is often used by nurses to make an emergency ice pack because it is strong and pliable when wet.

Future trends

The fact that vegetable parchment is grease resisting, has high wet strength and will not disintegrate even on boiling has made it a vital aid in solving many difficult problems. Used alone as a wrapper, the material meets many exacting requirements, and with the addition of special treatments and surface applications, it can do jobs never before thought possible for paper.

Almost every day new uses and applications of this versatile product are being found. Industrial applications, far afield of the normal food protection job it has done for many years, are increasing and as availability of pulps becomes more normal, the family group of 179 types is expected to grow.

Waxed papers

Where moisture protection is necessary, waxed papers readily fit into a great many packaging pictures. The reasons are obvious. First are the properties of wax that are inherent in the product. Wax itself is odorless, tasteless and not affected at ordinary temperatures by either acids or alkalies. It is not a host to either mold or yeast spores. The proper grades withstand a wide range of temperature without loss of protective powers. When a sufficient surface coating of wax is applied to the right kind of paper, it is easily and completely sealed by the application of heat, no glue being necessary. The grades of paper that may be waxed are many: tissues, twisting paper of several grades, regular and opaque sulphites, glassines, greaseproof krafts and manilas. Papers may be made opaque or highly transparent depending on methods and stocks.

Flexibility of wax paper

The equipment of a modern waxed paper company is very flexible in the kinds and weights of waxed papers that may be produced. The same raw stock may be waxed in a variety of ways, either lightly or heavily. A sheet may be waxed on one side only, impregnated with wax with little, if any, surface wax, or waxed lightly or heavily on both sides of the sheet with or without much penetration of the sheet as is desired. Package wraps are made to fold readily around a carton. When printed in several colors, beautiful effects are obtained, and the proper wax coating over the printing gives a fine glossy appearance.

Its adaptability and economy account in large part for the ever-increasing amounts and kinds of waxed paper now in regular use.

The laboratories maintained by waxed paper manufacturers, ink makers, paraffin and resin manufacturers, working separately and often in conjunction with each other, have developed many "tailor-made" papers to solve some particular problem. By working, also, with the manufacturers of wrapping and carton lining equipment, it has been easy to develop the right paper and the right wrapping or lining machine for almost any kind of package. Waxed papers are widely used, and some of the more common uses are here noted:

Bread wraps—Waxed bread wrappers are of three general kinds. The one ordinarily used is the opaque wrapper printed in bright colors. The latest development in the use of this type of wrapper is "electric eye" registration. With this device attached to the wrapping machine, a top and two side panels may be registered the same on all loaves. If the eye is not used on automatic wrapping machines, the printing must be of a continuous nature so that it need not be registered on the loaf. Some bakers have also added equipment for applying an identifying end seal on both ends of a loaf to provide additional identification on the ends of loaves.

Transparent waxed wrappers are also widely used, especially on special breads such as rye, whole wheat, raisin, etc., adding to sales appeal. Transparent sulphite and glassines are both used, and are popular not only as a bread wrapper but also for packaging sweet goods, cakes and rolls.

Blank cartons with printed wraps and liners—The waxed paper industry has come a long way since cartons were first wrapped in waxed paper. They are wrapped to protect the contents against moisture loss or gain. Originally, an ordinary waxed sulphite was used which partially obscured the printing on the carton. A more transparent wrap was developed and then a super-calendered sheet of high gloss and transparency followed. This was, and still is, an excellent wrap for a printed carton, combining reasonable cost with a high degree of transparency and protection, and is readily usable on any self-sealing wrapping machine. Considerable tonnage is used by manufacturers of foodstuffs.

Printed wrappers on glossy opaque stock were the next logical step, followed closely by the wrapper with electric eye registration. Fine process printed wraps of two, three and four colors are now common, and the panels may be registered as to printing with respect to the carton so the appearance is that of a printed carton. This makes a most convenient and economical method of producing a mois-

1—For some products, outer wrappers of waxed paper are used; waxed inner liners are better for others. Photo, Central Waxed Paper Co.

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2—Cookies retain their bakery crispness when they are protected by waxed paper. Specially designed materials in this class have given excellent service in the place of metal foils for retaining the flavor of candies and chewing gum. 3—Protection as well as package appeal are afforded to frozen foods by their waxed paper wraps. Photos 2 & 3, Nashua Gummed & Coated Paper Co. 4—Waxed bread wraps may be variously printed, registered by "electric eye." Photo, Marathon Corp.

tureproof package, especially if a large variety of brands is manufactured. Much less money is tied up in inventories with printed waxed paper than is necessary if dozens of different printed cartons had to be held in stock; and at the same time less storage space is needed. Plain cartons may be used with any number of different printed wraps.

There have been considerable standardizations of carton sizes in the last few years so that the number of sizes of cartons, compared to the number of brands and designs used, is small. It is not unusual to see a foodstuff manufacturer with only three or four carton sizes producing a hundred or more brands, many under special label, and the balance in his own line. In cases like this, it is an advantage to carry plain cartons and printed waxed paper.

Biscuits, gum, soap, salt, butter, candy, yeast and dehydrated eggs are but a few of the products adequately protected by waxed wrappers properly registered by means of the electric eye.

Carton liners—The plain chipboard of the carton is protected from the contents by the use of waxed glassines, krafts or sulphites, placed in sheets or in die cut form by hand, or automatically cut from rolls and inserted by the carton forming machine. When the product to be cartoned has a grease or shortening content, the waxed liner most commonly used is a waxed glassine. The reason for this is that a glassine paper is greaseproof and prevents the absorption by the chipboard of the shortening which would cause unsightly penetration. However, some packagers prefer using waxed bag liners.

Government use—There is no better proof of the ability of a proper wax coating to protect foodstuffs from atmospheric changes than its use by the Quartermaster Corps which specifies heavily waxed wrappers, or wax-dipped cartons for packaging U. S. Field Ration K in breakfast, dinner and supper packages. These packages may be subjected to the worst possible climatic conditions—in the steaming jungles of the South Pacific, the baking heat of North Africa, or the sub-zero cold of Arctic regions. Yet these concentrated food rations reach the men in good condition, thanks to a great extent to the protection of wax. The climatic conditions, the irregularity of storage and transit facilities, to which these rations are subjected, far surpass any to be found in normal use. Dried eggs, protected by a wax wrapper, are shipped in huge quantities under Lend-Lease agreement.

Butter—Some creameries have changed the type of waxed paper used on their automatic butter-wrapping machines. These machines first wrap the butter in parchment which can be stripped off easily without butter clinging to it. Many creameries then add a dry wax wrapper, which gives partial protection against loss of weight through evaporation. Surface-coated waxed sheets, though they contain no more wax than the impregnated or dry sheets, are considerably more resistant to moisture. For this reason, several of the larger creameries which formerly used dry waxed paper now use a sheet with a surface coating thereby increasing the protection offered.

Chewing gum—Much of the stick gum, formerly individually wrapped in laminated foil, is now wrapped in

specially made waxed papers, thus releasing large quantities of aluminum and other metals critical in wartime.

These examples adequately demonstrate not only that waxed paper stands on its own feet as a packaging material, but also that through complete cooperation among refiners and manufacturers of both waxed paper and machines, it is readily adaptable to an even greater diversity of practical uses.

Frozen foods—The paper used for wrapping frozen foods is specially waxed. The regular wax coating is fortified by the addition of certain other waxes or other substances to ensure a seal and flexibility that will withstand the extremely low quick-freezing temperatures to which these packages are subjected. The wrapping equipment in many of the frozen food plants is equipped with the electric eye. With the restrictions on the use of tin cans for packing foods, the production of frozen foods will no doubt increase at an accelerated rate, and the waxed paper used will increase proportionately.

Meats—At ordinary cold storage temperatures, a straight wax coating does everything asked of it. Several years ago waxed liners began to replace parchment in poultry cases because they offered better protection against oxidation and "freezer burn."

For many years the meat-packing industry has used large amounts of waxed paper. The advent of the cold storage locker service marked the beginning of one of the most rapidly mushrooming businesses in the country. Fresh-killed and cut meats can be kept satisfactorily for many months at below-freezing temperatures, thanks to the development of specially made waxed papers. A satisfactory locker paper must be strong, wet or dry, bloodproof, and able to withstand extremely low temperatures. It must also be moistureproof yet dry on one side so that the butcher may stamp the date and kind of meat on it. All of these qualities are available today in many waxed papers.

Candy—While the candy trade has for years been using various grades of waxed papers, in recent years the manufacturers of candy bars especially have turned more and more waxed transparent glassines, opaque glassines, and opaque sulphites, some coated with a combination of high-melting-point waxes. This trend has increased in the past year as the use of other types of wrappers has been restricted. In addition to satisfactorily replacing foil with an attractive printed wrapper, the savings in cost of the wrapper help to make up for the increased cost of the other materials and the labor that goes into the manufacturing of the candy bar itself.

For a great many years waxed paper has been used as a wrapper for candy kisses, where a sheet with special twisting qualities is required. Twisting qualities may be imparted to sheets of other materials by the addition of controlled amounts of a plasticizer. Through recent developments in this art, transparent waxed glassines are now used quite generally as twist wrappings for candy.

Household uses—Growing in popularity with the housewife is waxed paper in convenient rolls for many uses around the home. These are normally available under various trade names at moderate prices.

Special bags—Aside from bags used as carton liners and for bread wrappings, bags are made of waxed or wax-laminated paper for a variety of other products. Potato chips and popcorn are often packaged in this way, while envelopes of laminated glassine or sulphite are used extensively for packing flavoring powders.

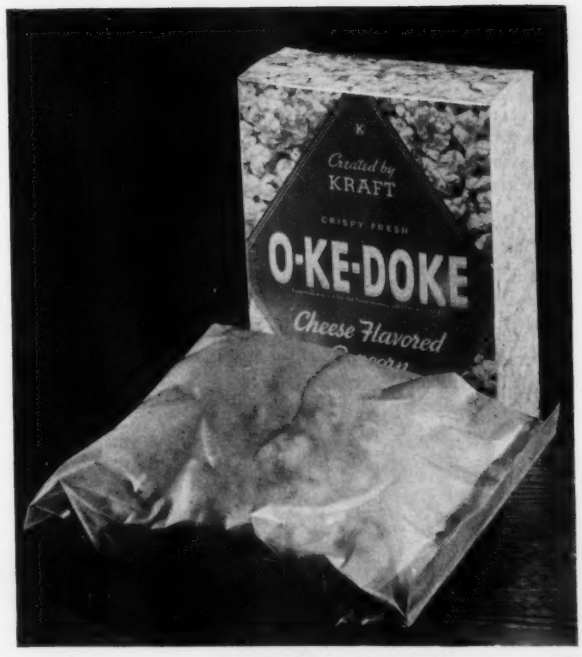
Research is continuous. The waxed-paper industry will be equal to the demands put upon it in these trying times, as has all business in this country. Laboratory research will continue at an activated pace, to be ready with better products for new as well as old uses. If war has no other benefit, it stirs all industry to find better, cheaper, easier ways to protect the necessities and the luxuries of life.

5—The wax coating for frozen food wraps is fortified to ensure flexibility and a seal which will withstand extremely low quick-freezing temperatures. Photo, Marathon Corp. 6—Special wax-like coating is employed for a low-heat-seal bag. Photo, Goodyear Tire & Rubber Co.

5



6



Wet-strength papers

When a paper retains its toughness after being saturated with water, it has the property of wet strength. This property is extremely important today in papers used for military shipments and substitutes for other packaging materials, such as shipping containers that will not fall apart or scuff when soaked with water, paper bags used as substitutes for wrapping vegetables and meats.

In the past, several materials and processes have been used to impart such property to paper: glue formaldehyde, regenerated cellulose (viscose), urea formaldehyde, zinc chloride and parchmentization. All these treatments require special equipment in the paper mill.

Recent discoveries have proved that the new melamine-aldehyde resins have unexpected characteristics in giving wet strength to paper without the addition of special equipment. This development is of particular interest to users of packaging supplies when specifying papers where a high degree of wet strength is essential.

Melamine compounds for paper treatment are received at the paper mill in finely divided form. This product needs only to be dissolved in warm water containing hydrochloric acid and then allowed to stand for a few hours before using. During this aging period the colloid is formed and it is this colloid which attaches itself to the paper fibres. The most satisfactory point of application for the resin solution is after all beating and other refining have been completed, and as close to the paper-machine wire as operating conditions permit. This material has a particular characteristic which some other materials previously used for this purpose do not have. The melamine resin is largely retained by the paper fibres so that it is not lost in the water of the paper-making process. Because of this fact, it can be added to the paper pulp before the sheet is formed without requiring modification of either machine or operation in the paper mill. The use of acid-melamine resin formula, it is claimed, does not endanger paper itself or paper-mill equipment. The explanation is that the acid does not go with the paper but remains with the white water. Tests have shown that addition of these materials does not have a corrosive effect on the paper plant equipment.

The following test results show how melamine treatment of paper pulp imparts extraordinary wet strength to the sheet to which it has been added and at the same time greatly increases folding resistance of the dry sheet.

Cellulose fibres treated with not in excess of 3 per cent of the melamine resin colloid retained 70—90 per cent of the added resin. The wet strength, as measured by wet tensile strength after soaking 16 hr., increased from almost nothing to 50—60 per cent of the original dry strength. Wet Mullen increased in about the same proportion, while the wet rub resistance (double strokes to wear through the paper) rose from an average of 10 to several thousand. This latter property should be of interest in connection with the treatment of containers for such products as kitchen cleaning powders, where the container is often in contact with water.

Dry Mullen and dry tensile values were increased about

TABLE I.—OVEN-AGING TESTS*—105° C.

Type of Resin	*Applied at*	*Wet Tensile,† Hours Aged*			*Fold-MIT Hours Aged*			*Tear-Elmendorf-g., Hours Aged*		
		0	*16*	*72*	*0*	*16*	*72*	*0*	*16*	*72*
UNTREATED KRAFT		0.5	1.4	1.9	223	219	152	84	79	75
UREA-FORMALDEHYDE	Tub	10.3	10.8	11.2	189	120	40	45	47	34
MELAMINE-FORMALDEHYDE	Tub	4.6	11.9	11.4	191	89	41	64	48	38
MELAMINE-FORMALDEHYDE + HCl	Beater	8.1	9.3	9.0	1035	834	461	69	72	54

* All tests made on bleached kraft handsheets with approximate basis weight of 50 lb. (25 in. × 40 in.—500).
† Wet tensile measured in machine direction on strips soaked 16 hours. Results expressed as pounds per inch.

TABLE II.—EFFECT OF ADDING RESINS BEFORE OR AFTER REFINING*

Length of Beater Treatment (Full Load), Min.	*Length of Morden Refining, Min.*	*No Resin Added*		*Resin Added‡ Before Morden*			*Resin Added‡ After Morden*		
		Fold, MIT	*Wet Tensile†*	*Resin, %*	*Fold, MIT*	*Wet Tensile†*	*Resin, %*	*Fold, MIT*	*Wet Tensile†*
0	0	2	1.0	1.5	24	2.7	1.4	18	2.9
15	0	28	2.0	1.7	264	5.1	1.5	522	7.0
15	2	114	2.4	2.2	1074	7.8	2.0	1148	10.2
15	5	576	2.9	2.4	1177	7.6	2.1	1141	11.7
15	15	1537	2.7	2.4	1517	6.6	2.3	2160	15.8
15	30	1762	2.5	2.3	3181	5.3	2.4	3233	14.4

* All tests made on bleached kraft handsheets with approximate basis weight of 50 lb. (25 in. × 40 in.—500).
† Wet tensile measured in machine direction on strips soaked 16 hours. Results expressed as pounds per inch.
‡ 3% Resin (on dry fibre basis) added in each instance.

1—Wet-strength white kraft, which has been printed, forms the exterior of this 2½-lb. size duplex bag. The liner is made of a laminated wet-strength glassine. Photo, Benj. C. Betner Co. 2—Wet-strength paper is used for multiwall bags to prevent deterioration of such products as potatoes, packed wet. Here bags are tested with a 24-hr. water spray.

15 per cent. The folding endurance, instead of dropping, as in the case when wet strength is obtained by tub treatment, was materially increased.

Aging properties of paper stock with melamine resins were shown by the following results. Under accelerated oven aging conditions of 72 hr. at 105° C. (aging test used by U. S. Bureau of Standards), the folding endurance of the melamine-treated paper so aged was higher than that of the original untreated paper and was much higher than the tub-treated samples.

Tearing strength is lowered by all wet-strength treatments, but the melamine-treated paper shows less lowering of tear values than tub-treated paper does.

As far as is known, any of the usual paper-making sizing materials and fillers may be used with the melamine treatment without deleterious effects. Experiments in which various types of dyes were incorporated with the melamine-treated stock showed changes in shade, strength and fastness properties of some dyes. In certain instances fastness to bleeding in hot or cold water was definitely improved. In other instances, decreased fastness to light was observed, usually proportional to the amount of resin used.

By considerable laboratory research and mill trials, it has been concluded that the melamine treatment is effective on any form of cellulose fibre, although results are more noticeable when used with a strong pulp. A wet-strength kraft sheet may have a dry tensile strength of 20 lb. and a wet tensile of about 10 lb. Groundwood sheet given similar treatment showed a dry tensile of 2 lb. and a wet tensile of 1 pound.

The following characteristics of other processes for wet-strength treatment will help the user of such material or paper to make comparisons of relative qualities:

Glue formaldehyde has an unpleasant odor which makes it unsuitable for papers in direct contact with foods. It requires special equipment and cost of ingredients is high.

Regenerated cellulose—This is expensive and requires very special equipment which is not suited to paper mill operation, although resulting product can be made with high wet-strength, durability and greaseproof properties. Paper so treated is suitable for direct contact with foods.

Urea formaldehyde can impart excellent wet strength both to rosin-sized and waterleaf paper when the paper web is impregnated with the resin solution and the resin subsequently cured on the paper-machine driers. Until recently this was the only satisfactory method of applying urea-formaldehyde resins to paper, therefore limiting the use of these resins to mills having special application equipment. Recently, certain modified urea-formaldehyde resins have shown some promise in beater application, and several have been promoted during 1944.



1


2

Parchmentization is usually applied to lightweight stock, requires special equipment, is expensive, but imparts high wet-strength and greaseproof properties.

Melamine-formaldehyde—Fold resistance is increased over that of untreated paper. Dry tensile and bursting strength are increased moderately, but definitely. The wet-strength properties of the treated papers are much more permanent when stored at high temperature and humidity than wet-strength properties imparted by urea-formaldehyde resins. Water resistance of rosin-sized papers is increased slightly by this process. Retention of clay fillers has been improved in some instances. Although tear resistance may, in some cases, be reduced slightly, the amount of drop is less than the loss from tub-sizing processes which have been examined. Application is simple and the cure rapid. The dry resin is stable and therefore may be kept as a stock item.

Melamine is being made in increasing quantities and is available for essential civilian and military uses although, due to the shortage of formaldehyde the supply situation changes from month to month. In many instances, the additional dry strength obtained from melamine-treated papers, it is said, could permit the use of lighter papers.

Reference: Charles S. Maxwell, "Use of Melamine Resins for Better Wet Strength," a paper presented at TAPPI Convention, February 16, 1943.



1

1—*Prewar uses of metal foils for packages were varied and multitudinous. Postwar promises for these protective and decorative materials are great. Typical applications are bottle caps, candy bars, cheese wraps.*

Metal foils, technical aspects

Packaging materials have received the urgent attention of producers, converters, packers and government agencies alike in meeting war demands. Unprecedented quantities of wrapper and container materials have been furnished to protect vital supplies under the most severe conditions of handling and storage. In spite of time limitations, this enormous job of packaging has proceeded smoothly and without too many setbacks. The application of seasoned experience to new problems has played an important part in this development.

Throughout the war, increasing recognition has been given to the importance of metal foils in packaging. Although much has been written explaining their uses, little information has been available regarding their actual physical characteristics. The layman still thinks of all foil as "tin foil," despite the fact that foil is now available in a number of metals. In this article, the various commercial foils are described and their basic physical characteristics pointed out, particularly as they relate to the packaging field.

According to Webster's dictionary, foil is a "leaf" or very thin sheet of metal. From the manufacturer's viewpoint, foil is metal rolled to gauge ranging from 0.005 in. to about 0.0002 inches. Metal foil may be prepared from a commercially pure metal or from an alloy.

The metals commonly used in the production of foils are tin, lead, zinc and aluminum. Of these, tin and lead are the oldest in point of service. Zinc is used as foil in very limited amounts. Copper is available in foil thicknesses but its uses in this class are restricted to highly specialized applications. The precious metals may be rolled to foil but, for obvious reasons, they are not considered commercially useful.

Aluminum has been available in the form of foil for more than 30 years and has reached a leading position as a result both of its inherent properties and of technical developments in the field.

The methods followed in producing foils of various metals have certain similarities: the breakdown of the cast ingots through the slab stage into coiled sheet strips and finally into coils of foil. Transition of the cast ingot into foil is made by repeatedly passing the metal through rolls adjusted to width, diameter, weight, shape, temperature, pressure and speeds.

Basic changes in procedure are made when necessary to meet specific differences in the metal or alloy being rolled. For instance, aluminum is hardened by the mechanical working resulting from cold rolling. Its tensile and yield strength are higher in this strain-hardened condition and its elongation is lower. This characteristic of aluminum requires that the metal be softened by annealing at intervals during the rolling process. No annealing is necessary in the rolling of lead, tin and zinc. A final anneal after the desired gauge is reached is normally used for aluminum in order to supply the metal in the soft or annealed condition. The annealing operation also frees the metal from the small quantity of lubricant not squeezed off by the rolls.

The annealing conditions in commercial practice will vary, depending upon the thickness of the metal, its width and its coil diameter. As a rule the metal temperature reached will be higher than 550° F. The time of heat-

ing is determined from experience and may vary from a matter of minutes to hours, depending on conditions. The high temperatures necessary for the final annealing of aluminum foil produce a clean and sterile foil which is immediately suitable for many critical packaging duties.

Zinc can be rolled to foil thicknesses with equipment suitable for producing aluminum foil. Lead and tin foils are best rolled on differently shaped rolls, with different roll lubricants, and wound on reels instead of spools.

Neither lead, tin nor zinc requires annealing of the finished foil to obtain softness, because this condition is attained automatically at room or rolling temperatures. The procedures for all four metals are alike in that they are all "cold rolled." The percentage reduction in thickness per pass varies, depending on the metal's individual characteristics and also, to some extent, on the type of mills used and the practices preferred by the various foil-rolling companies.

Metal foils may be produced on 2-, 3- or 4-high mills (the numbers representing the number of rolls, one above another) built especially for this operation. Tandem mills, where two or more mills are operated as a unit, may be fitted to coiled sheet and foil operations.

"Cluster" type mills, where rolls are arranged in one mill stand to permit applying a series of reducing passes on the metal, also are used in foil rolling.

Metal foils differ among themselves in physical and chemical characteristics and it is these differences, along with economic considerations, that must be examined carefully when choosing the foil to meet specific packaging requirements. The chemical characteristics of the foil metals are generally known, but when deciding the suitability for a given application, it is desirable to confirm the tentative selection by means of practical packaging and storage tests.

The fact that aluminum is non-toxic is well known because of the metal's background of experience in cooking utensils and its many successful applications in the food industries. Similarly, tin in the form of tinplate has set a standard in the canning industry. In many cases the packaging usefulness of these and other foils can be extended by means of protective coatings which will serve as a barrier against reaction between the packaged goods and the metal. A knowledge of the product to be packed, its expected durable life and the conditions of storage, when considered along with information of chemical reactions possible with the metal foils, will enable a selection to be made in many cases.

Frequently one of the most important characteristics of a packaging material is the resistance it offers to penetration by moisture or other gases. Metal foils are outstanding in this respect since, when free from pinholes



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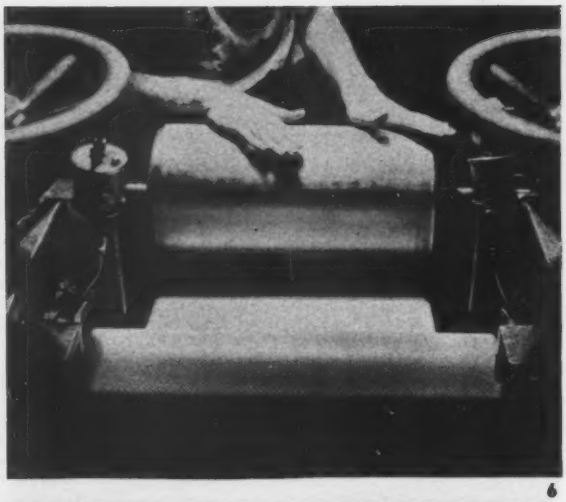


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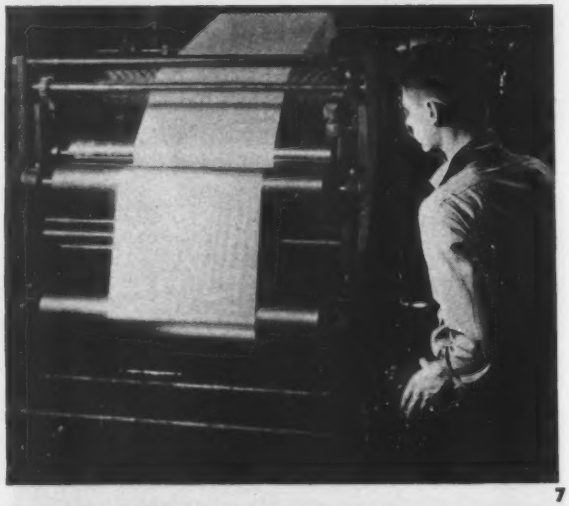
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2—Aluminum for conversion into foil reaches the mill in the form of rolls of light gauge sheet. Here they are in a preliminary breakdown mill which reduces the sheet to a gauge of about 1/32 inch. 3—By means of an intermediate mill the foil is rolled thinner. 4—Extremely light gauge is obtained by passing 2 thicknesses of metal through rolls at the same time. This is a separating machine which divides sheets, rolls them separately. 5—Charging rolls of foil into an annealing furnace.



6

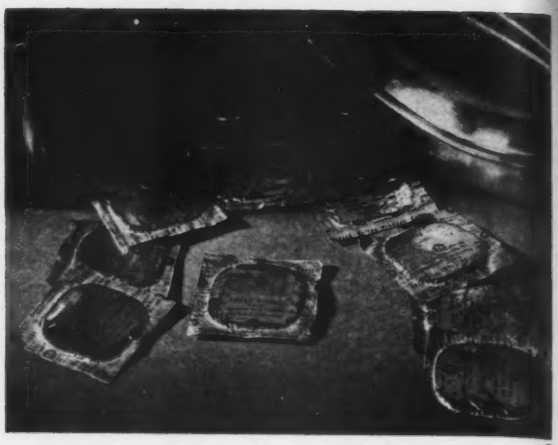


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6—When an embossed pattern is desired on the foil, it is passed through such an embossing roll as this one which impresses the pattern into the sheet. 7—If it is desired, a paper backing may be applied to the aluminum foil. This equipment is typical of that used for the purpose. 8—Here the finished rolls of foil are being packed into cases for shipment. 9—Characteristic of aluminum foil packages developed during the war is this familiar packet for soluble coffee, a fixture in Army rations. Range of postwar potentialities for such packages is wide.



9

or other defects, they are completely impervious. Metal foils can be produced in thickness of 0.001 in. or more, relatively free from pinholes, although in the thinnest gauges some pinholes are unavoidable. When the foil is coated or laminated with plastic materials, pinholes can be sealed. Lamination with plastics may add other desirable characteristics, such, for example, as the increased resistance to tearing which results from creasing and handling.

The specific gravity or density of foil is usually associated with the covering area per unit of weight. This is a significant factor to consider for wrappers or packages. Some typical figures are give in Table I.

The values for tensile strength (p.s.i.) or percentage elongation obtained from mechanical property tests on metal foils change with variations in thickness of the sample tested. Because of these variations the mechanical properties (yield strength, elongation, bursting strength and tearing strength) are not in themselves sufficient for evaluating the usefulness of metal foils as materials for packaging.

It should be emphasized that the mechanical characteristics of metal foils can be modified by means of suitable coatings either in the form of lacquer, paper or plastics. Thus, through the use of foil in combination with suitable supporting media, a product may be obtained which often approaches the ideal.

Table I.—Some Typical Properties of Metal Foils

Metal	*Description*	*Density, grams/cc.*	*Thickness, inches*	*Covering area, sq. in./lb.*
Aluminum	Commercially pure	2.7	0.0010	10,250
Lead	Commercially pure	11.3	0.0010	2,450
Tin	Commercially pure	7.3	0.0010	3,750
Zinc	Commercially pure	7.2	0.0010	3,980
Lead composition	Lead alloy with 4% tin	..	0.0010	2,500
Lead composition	Lead alloy with 10% tin	..	0.0010	2,550

PROPERTIES OF METAL FOIL

The values reported in this chart were obtained from varions sources and are believed to represent acceptable commercial

Manufacturers should be consulted for additional special information or for new uses of their materials. Becaus

PROPERTIES	METAL FOILS				
	Aluminum Foil	Tin Foil	Lead Foil	Tin and Lead Composition Foil (4% Tin)	Lamin cello
GENERAL					
Forms Available	Rolls & sheets	Rolls & sheets	Rolls & sheets	Rolls & sheets	
Clarity	Opaque	Opaque	Opaque	Opaque	
Thickness Range, in.	0.0003–0.005	0.0006–0.002	0.0006–0.002	0.0006–0.002	
Maximum Width, in.	30.5	26½	26½	26½	
Area Factor, sq. in. per lb.	10,250	3,750	2,400	2,500	
Specific Gravity, approximate	2.7	7.3	11.3	11.1	
MECHANICAL					
Tensile Strength, lbs. per sq. in.	6,500–11,000	—	—	—	
Elongation, per cent	2–15	—	—	—	
Bursting Strength (Mullen) lbs. per sq. in.	16–17	4–7	4–6	6.5–9	
Tearing Strength (Elmendorf), grams	—	—	—	—	
Folding Endurance	—	—	—	—	
CHEMICAL					
Water Absorption in 24-hr. Immersion Test, per cent	0	0	0	0	
Moisture Vapor Permeability,[1] grams/24 hrs./100 sq. in. at 100° F. 95% R. H.	Depends on thickness 0 to high	Depends on thickness 0 to high	Depends on thickness 0 to high	Depends on thickness 0 to high	
Permeability to Gases	0	0	0	0	
Resistance to Acids	Poor to good	Poor to good	Poor to good	Poor to good	
Resistance to Alkalies	Poor to good	Poor to good	Good	Poor to good	
Resistance to Greases and Oils	Good	Good	Good	Good	
Resistance to Organic Solvents	Good	Good	Good	Good	Attack
PERMANENCE					
Resistance to Heat (Limiting Temp.), ° F.	700° F.	300° F.	500° F.	450° F.	
Resistance to Cold (Limiting Temp.), ° F.	—120° F.	—	—	—	
Resistance to Sunlight	Unaffected	Unaffected	Unaffected	Unaffected	
Dimensional Change at High R. H., per cent	None	None	None	None	
Resistance to Storage	Unaffected	Unaffected	Unaffected	Unaffected	
Flammability	Not combustible under ordinary conditions	Not combustible	Not combustible	Not combustible	
Manufacturers	Aluminum Co. of America Johnson Tin Foil & Metal Co.	Reynolds Metals Co. Johnson Tin Foil & Metal Co.			

[1] Using $CaCl_2$ in Test Dish; method is described in ANC67 Army-Navy Specification.

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AL FOILS AND FOIL LAMINATIONS

cceptable commercial standards. Special grades of some of these materials may be obtained which excel in som
ir materials. Because of wartime restrictions, some of the materials listed in the chart may not be available for

	METAL FOIL LAMINATIONS			
and Lead position Foil 4% Tin)	Laminated kraft—metal foil—cellophane—lacquer coating	Butvar coating—lead foil—asphalt, kraft—resin—cloth	Butvar coating—lead foil—asphalt—kraft	Heat alu
s & sheets	Rolls and sheets	Rolls	Rolls	
Opaque	Opaque	Opaque	Opaque	
006–0.002	0.007	—	—	
26½	24	40	—	
2,500	2,300–2,600	1,325	1,655	
11.1	—	—	—	
—	—	70	60	
—	—	—	—	
6.5–9	60	75	60	
—	110–130	—	166	
—	—	—	—	
0	High	Low	Low	
ds on thick- 0 to high	0.1 to 0	0.01–0	0.01–0	
0	0	0	0	
r to good	Poor	Poor	Poor	
r to good	Poor	Poor	Poor	
Good	Good	Excellent	Excellent	
Good	Attacked by aromatic & active solvents	Poor	Poor	
50° F.	180° F.	300° F.	300° F.	
—	—25° F.	—10° F.	—10° F.	
affected	Excellent	Good	Good	
None	Slight	Slight	Slight	
affected	Excellent	Good	Good	
ombustible	Slow burning	Slow burning	Slow burning	
	Reynolds Metals Co. Shellmar Products Co.			D M S

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xcel in some particular property.
vailable for all purposes.

foil—	Heat-seal lacquer coating—aluminum foil—cellulose acetate
	Rolls
	Opaque
	—
	—
	6,000
	—
	40
	—
	79
	26
	—
	Negligible
	0.01–0
	0
	Fair
	Poor
	Excellent
	Poor
	—
	—20° F.
	Good
	None
	Good
	Slow burning
	Dobeckmun Co. Milprint Inc. Shellmar Products Co.

Technicalities of laminated structures

by C. A. Southwick, Jr.

Lamination is the process of combining two or more plies of material into a single structure by means of an adhesive composition between their inner surfaces. By this process combinations of materials can be formed which possess new and better functions.

Lamination makes it possible to form a structure in which many excellent properties can be achieved, depending upon the choice of ply material and the kind and formulation of the adhesive or laminating agent. The choice of ply materials controls the strength and durability of the finished structure and the kind and degree of chemical function which it will finally perform.

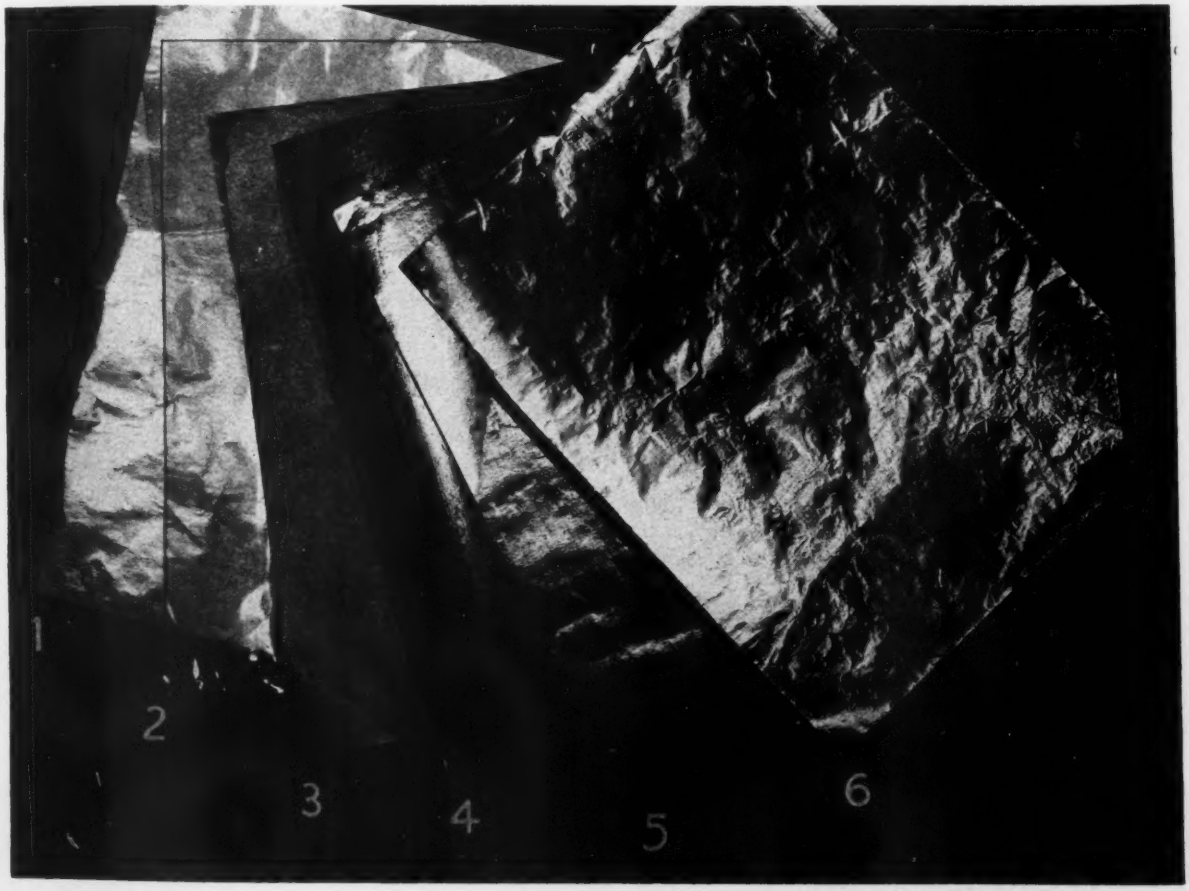
The laminating agent contributes little or nothing to actual strength, but its composition will affect pliability and durability, and in many cases it is the determining factor in the chemical functions of the final laminate.

There are many packaging materials which, by themselves, do not provide sufficient function to be either satisfactorily or effectively formed into a package. By laminating these materials, it is possible to develop a final combination for a variety of functions not otherwise possible.

It is a well-known fact that there are certain limitations in the use of surface-coated materials which affect their use in many package-forming operations. For example, because of the difficulty of adhesion and the fact that surface coatings are subject to abrasion, it is not always possible to develop sufficient mechanical strength and other functions in a single coated sheet. However, by modifying a coating material to give the same functional characteristics and greater adhesive qualities, the material may be used as a laminating agent and can be applied as a continuous film between two plies of paper, cellophane, etc.

The final result will be a laminated combination, then, that has greater durability because the film is protected against abrasion, fractures by folding, and furthermore can be adhered by conventional adhesives. Such a resulting structure also has good working characteristics because it is softer and has less surface smoothness. The most important element in a compound laminated structure is the material used between the plies because the choice of this material determines the pliability and resistance to delamination in use. Also the choice and formula-

1—New properties may be achieved by laminating two or more piles of material. Each of these typical laminations has its own packaging application.



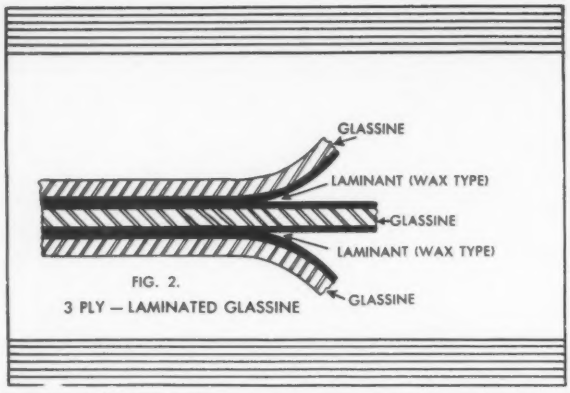


FIG. 2.
3 PLY — LAMINATED GLASSINE

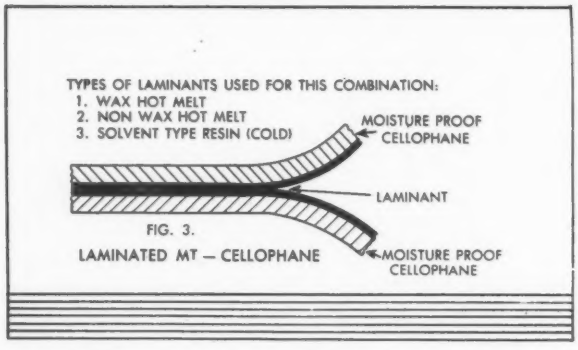


FIG. 3.
LAMINATED MT — CELLOPHANE

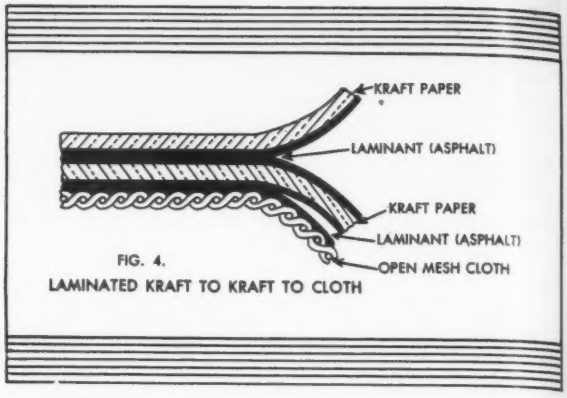


FIG. 4.
LAMINATED KRAFT TO KRAFT TO CLOTH

tion of this laminant determines the kind of equipment on which the material must be made and the quantity that must be applied for the most efficient development of any particular function.

A very good example of a laminated structure which has found increasing commercial use consists of two plies of glassine paper combined with five pounds per ream of a waxy laminating agent. Glassine paper, in itself, is greaseproof and flavor-tight, but in normal weights it does not possess great physical strength and it has no resistance to the transmission of moisture vapor. By combining two glassine sheets with a continuous layer of a waxy laminant, the resulting structure possesses all of the attributes of the original sheets and also has greater pliability, in addition to a low level of moisture-vapor transmission.

If these same functions were accomplished by means of surface coating of a waxy type, it would necessitate a heavy glassine sheet with added plasticizer and this material could not readily be used in fabrication operations because it would require special adhesives and the surface coating would be very susceptible to mechanical abrasion and degradation.

Any metal foil, resinous or cellulosic film, paper, cloth, etc., may be used for the plies of a laminated structure and in many cases combinations of dissimilar materials are necessary to develop the necessary functional properties. Furthermore, laminated structures can theoretically possess any number of plies, although cost and other practical limitations usually limit this number to three or four. There are, however, some limitations as to the kinds of materials which can be laminated together, because of differences in dimensional stability, effect of heat or aging. For example, a combination of non-moistureproof cellophane to a plastic film, such as pliofilm, would result in a laminated structure one side of which would be affected by a dimensional change depending on the humidity of the air, while the other side would be independent of such dimensional change. The resulting combination would be prone to curling, puckering, and would be extremely difficult to fabricate.

It is also not advisable to try to laminate plastic water-insensitive films with aqueous adhesives because such adhesives are usually less plastic than the films themselves and would not provide the strength and durability of bond necessary to develop the maximum durability of the finished structure.

Resinous films or plies with heat-sealing coatings should be laminated with an agent which has a sufficiently high melting point or suitable flow characteristics so that the agent is not squeezed out of the area at the point of heat sealing. A good example of such a combination is laminated pliofilm, which is used for Method II packaging of airplane engines, etc. This structure consists of two pliofilm sheets combined with a moistureproof laminating agent, which is so formulated that it does not melt or flow when the pliofilm is heat sealed and, furthermore, maintains its ply strength at the heat-sealing areas. The latter is a very important point, because if the laminate is dispersed or otherwise affected at the heat-sealed areas the finished seam will show delamination or will not have sufficient strength for the outer ply to carry its proportional part of the load. In other words, the inner ply alone would be forced to carry stresses resulting from filling, handling and shipping, and the delaminated areas around the seal would have a lower resistance to the transmission of water vapor than the original structure.

The plasticity of the laminant should be such that it will not harden or crack at the temperature at which the final structure will be used. Such an embrittlement or limitation of the working temperature range of the laminant would result in either delamination of the plies or actual perforation of the plies if the structure were flexed.

Many laminated structures appear to be more flexible than the original materials because of the increased bulk and weight, but the true value of such plasticity can only be ascertained by exposing the finished structure to low temperatures. Flexing at various low-temperature levels

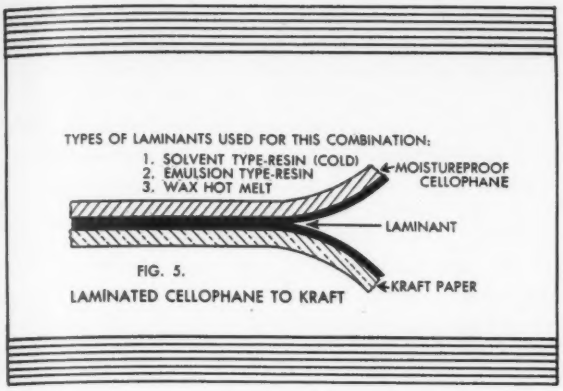


FIG. 5.
LAMINATED CELLOPHANE TO KRAFT

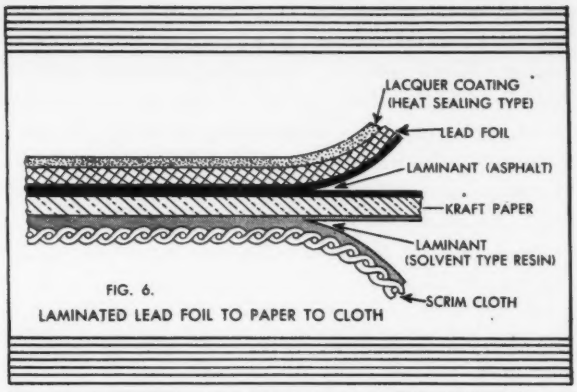


FIG. 6.
LAMINATED LEAD FOIL TO PAPER TO CLOTH

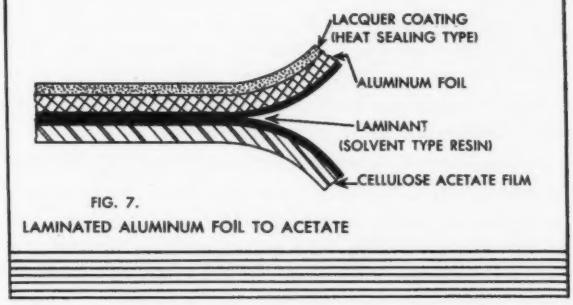


FIG. 7.
LAMINATED ALUMINUM FOIL TO ACETATE

will show that a temperature will be found at which either the laminant or the plies will fracture or become brittle independently of each other. It is not possible for the plies or the laminant mutually to plasticize each other and give a lower working temperature than either possesses independently. There are cases where the plasticizer of either the plies or laminant will migrate from one component to the other. If this occurs, embrittlement of the laminant results if its plasticizer migrates into the plies or softens if it gains plasticizer from the plies.

In either case, the laminated structure is degraded because the more brittle laminant will limit the working temperature range and a softened laminant usually loses its adhesive strength and delaminates at heat seals or at the edges.

Table I briefly tabulates the characteristics of different types of laminating agents, their properties and uses. This chart is not a complete pattern of all laminants, because there are many possible combinations of materials and types. For example, an aqueous emulsion can be made of a resin mixture dissolved in a solvent. Such a laminant would perform in some respects like both an emulsion and a solvent type depending on the ply material, the composition, and the choice of solvent. Also, each type of laminant is susceptible to a wide range of formulations which affect its operating, functional and use characteristics. Thus there is the possibility of considerable overlapping and duplication in use between each of these types.

The type of laminant is determined by the kind of ply materials, the functional and use requirements of the finished structure and the equipment available for its production. The particular formulation of any type of laminant depends on the surface characteristics of the plies and the process of making the laminations.

Any laminant must be formulated and adjusted to satisfy all of these factors to achieve an effective and durable finished structure. This adjustment of laminant, is less critical if each ply is of the same material but becomes more critical as the plies differ in kind. For example, many types and formulations of laminant can be used to combine two sheets of kraft paper. However, if the combination is to be a kraft sheet and a rubber hydrochloride film, for instance, the choice of effective laminants is immediately limited. The formulation must be carefully made and the equipment must operate with more precision and in a different manner than before. A laminant to adhere two distinct kinds of material must have the unusual property of having adhesion to two chemically and physically different surfaces. One surface may be water-wettable and porous, such as paper, while the other may be water-insensitive and smooth, such as a metal foil or certain resinous films. One surface may be wettable by solvent (a vinyl film) while the other may be smooth and solvent-insoluble (a metal foil).

The best way to appreciate the problem of the proper choice and composition of laminants is to dissect critically certain characteristic laminated materials which are performing outstandingly in civilian and war packaging. Examples of six materials are shown in Fig. 1.

Example No. 1 is a triple-ply glassine structure which has very low water-vapor permeability, high greaseproofness, and good package-forming characteristics. This structure is made by using approximately five lbs. of a waxy laminant per ream (3,000 sq. ft.) between each pair of plies of glassine. The laminant in this case is applied to the glassine stock above its melting point so that it has been completely liquefied. The second glassine sheet is brought into contact with the laminant and the combination run over cool rollers. This process is repeated twice to achieve a double lamination. The waxy laminant gives the sheet its plasticity and its moisture-vaporproof function. The laminant is formulated to have good adhesive qualities and to achieve whatever mechanical durability may happen to be required of the finished structures.

Example No. 2 is a laminated cellophane which possesses high physical strength, softness, greaseproofness and a low level of water-vapor permeability. This structure is similar to the glassine structure described pre-

viously except that it is a single lamination and in this case the laminating agent has been modified to have greater adhesive qualities because the cellophane surface is more highly finished and has a moistureproof lacquer coating. This particular laminant is a hot-melt type composed of paraffin wax with suitable modifying agents. The laminant contributes additional moisture-vaporproofness, since two moistureproof cellophanes are used.

Example No. 3 is a double-laminated structure which has been developed for high physical strength and waterproofness. This consists of two plies of wet-strength kraft-to-paper laminated with an asphaltic compound. This sheet is in turn laminated with an asphaltic compound to an open mesh cloth or scrim. The purpose of the cloth is to impart high tear resistance and general durability. The kraft adds additional physical strength and body to the sheet while the laminant resists the penetration by water. The laminant is formulated especially to give limited penetration into the kraft, however, since it is applied at a temperature above its melting point.

Example No. 4 is a combination of kraft paper and a moistureproof cellophane. This particular structure was developed to make a strong greaseproof wrapper for metal parts packaging. The greaseproofness is provided by the cellophane, the strength by the kraft, and the laminant in this case performs the simple function of combining mechanically these two plies into a workable combination. This laminant is a solvent type carrying suitable synthetic resins formulated to give great adhesive strength and low temperature durability. This structure was made by appling the laminant to the cellophane, removing most of the solvents and then combining to the kraft while the adhesive was still in a plastic condition.

Example No. 5 is a three-ply structure being used extensively for Method II packaging of war materials. This consists of a coated lead foil laminated with an asphaltic compound to kraft paper. This combination is in turn laminated in a scrim cloth applied to the kraft side with a solvent-type resinous adhesive. This finished structure is an excellent example of a multiple function which can be obtained by the ply members and the laminants. This sheet has substantially zero water-vapor permeability, is completely greaseproof, waterproof, and has very high mechanical strength and durability. Furthermore, it is very easy to form into an efficient package because the lead foil side has been coated with a heat-sealing lacquer. The lead-foil-to-kraft laminant is an asphaltic compound formulated for low-temperature durability, high adhesive strength, and to have limited penetration into the kraft on which it is applied as a hot fluid. The cloth is laminated to the kraft-lead-foil combination by means of a solvent-type resinous adhesive. The solvent adhesive is applied to the kraft and the cloth immediately combined to the wet adhesive and the solvent removed by the application of heat. In this case, solvent removal is easy because the porosity of the cloth allows rapid diffusion.

Example No. 6 consists of aluminum foil laminated to a cellulose acetate sheeting. This structure is being used for packaging the soluble coffee in the Army K Ration. This structure has a nearly zero water-vapor rate, sufficient durability and physical strength for use in small packages and envelopes and is made heat-sealable by the addition of a coating on the foil surface. In this case the laminant is a solvent solution of synthetic resins formulated for its adhesive qualities to the metal surface and with solvents which will not soften or affect the cellulose acetate. This structure is laminated by applying the laminant to the acetate sheeting, removing substantially all of the solvents, then combining to the foil by means of heat and pressure. Here it is necessary to remove the solvents before the plies are combined; otherwise, solvents would be trapped between the surfaces and would leave a deleterious effect upon durability of the laminated combination.

TABLE I.—LAMINATING AGENTS

Type	*Example*	*Function*	*Use*	*Remarks*
Aqueous solution	Dextrins. Animal glue, etc.	Greaseproofness. Great strength	Usually for greater strength and stiffness	Low cost. Water to be removed after combining. Usually used on papers or water sensitive materials
Emulsion	Rubber (Latex), resinous, etc.	Waterproofness (limited). Limited water-vapor resistance	For absorbent sheetings and paper	Water to be removed before or after combining. Usually used on papers or water sensitive materials
Solvent solution	Resins or gums, synthetic and natural rubbers in solvent solution	Wide range of water-vapor resistance, waterproofness, greaseproofness	Wide range of flexibility and durability	Solvent to be removed before or after combining. High unit cost. May be used with any material depending on choice of formulation and application techniques
Heat liquefied	Waxy, asphaltic, or resinous mixtures	Wide range of water-vapor resistance, waterproofness, greaseproofness	Wide range of flexibility and durability	Low to high unit cost. May be used with any materials. Wide range of application, temperatures from about 140° F. to 400° F. depending on composition. The so-called "hot melt" types are used at the upper part of this temperature range

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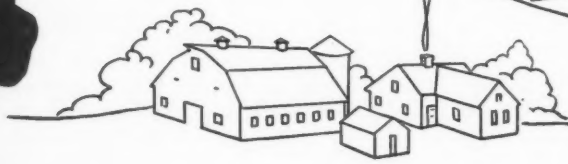
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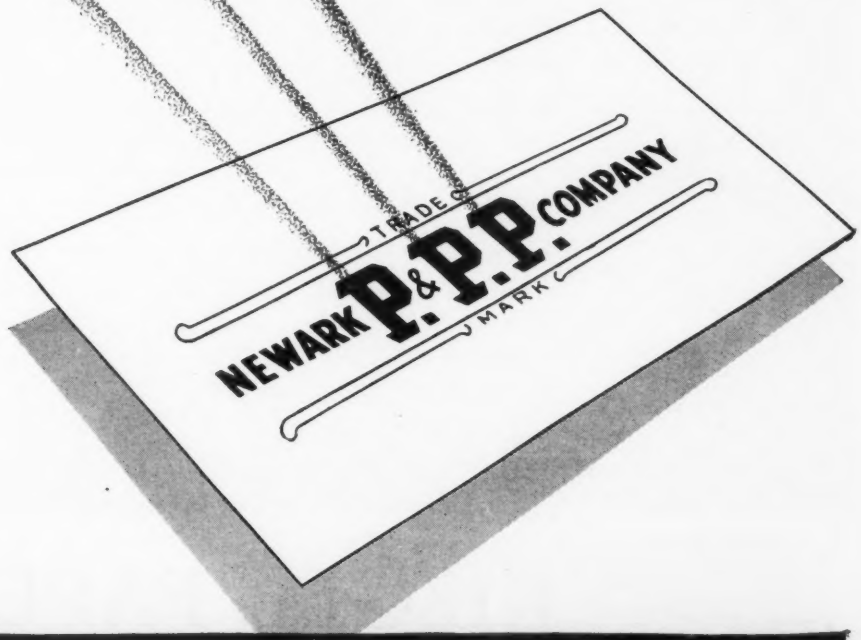
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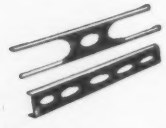
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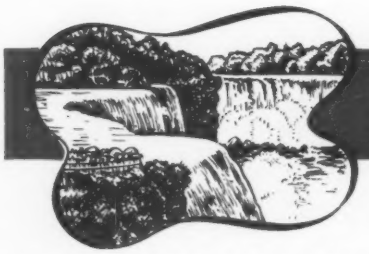
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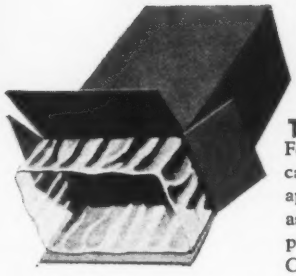
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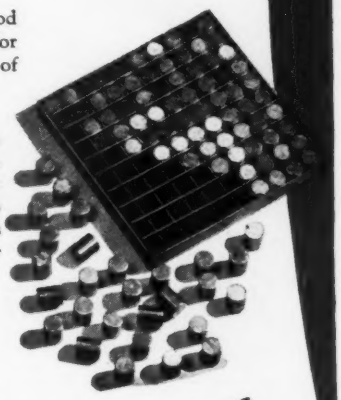
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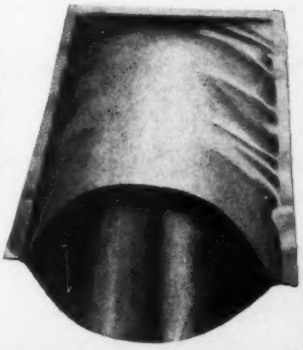


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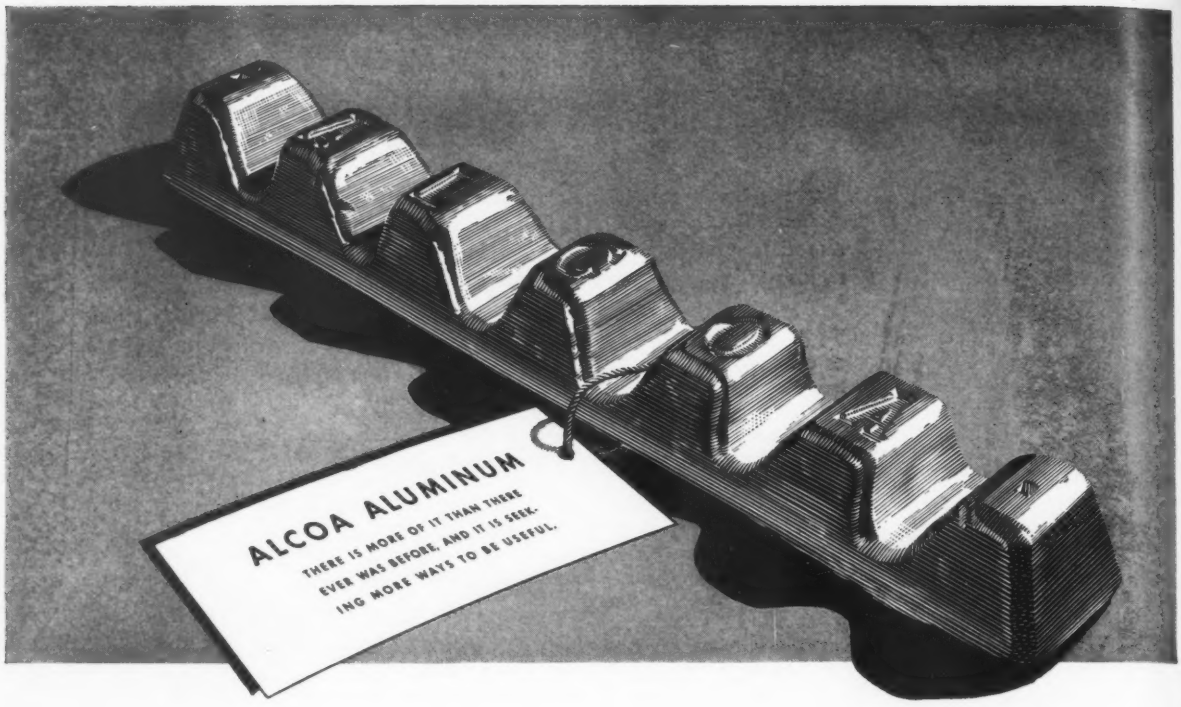
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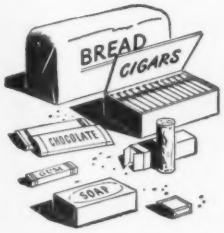
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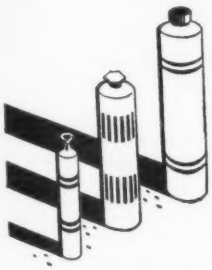
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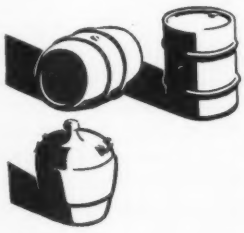
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If transparency is not feasible, consider an attractively printed flexible lamination of film and foil. Where rigidity is needed, a film or foil liner inside a box will give that "sealed-in-freshness" idea.

Many other good packaging ideas are available from Dobeckmun. Write us for suggestions or send us a sample of your present package, for an unbiased opinion. No obligation, of course.

CONVERTERS — PRINTERS — LAMINATORS of FILMS and FOILS

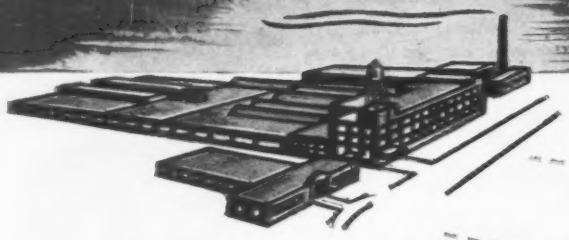
THE DOBECKMUN COMPANY

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WHATEVER THE PRODUCT . . . YOU'LL FI TH

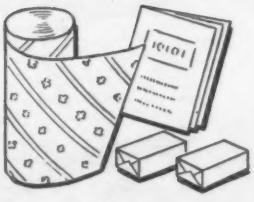


Shellmar has long been an outstanding source for nearly every type of package and packaging material.

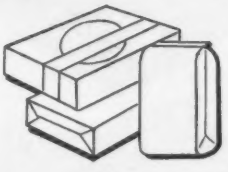
But with the coming of war Shellmar devoted its skill and facilities to the development and manufacture of the protective packages needed for the safe delivery of food and equipment to our fighting men. Many of these have made packaging history . . . the moisture-proof bags for shipment of complete aircraft engines, dehydrated soup and vegetable packs, packages for rations "D" and "K", for powdered eggs and lemon juice. Unheard of yesterday . . . yet today these packages are veterans of every brutal test of heat and cold, of dampness and mildew.

Today most of our actual production is still devoted to war . . . and it will be until the war is won. But most of our war-planning is over. Shellmar technicians and engineers are ready now to help you adapt these war-time packages to your peace-time needs. *Whatever your packaging problem call Shellmar today.*

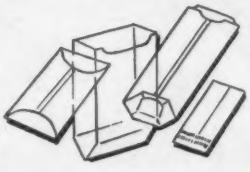
THERE'S A SHELLMAR PACKAGE OR MATERI



SHELL-PLI



FROZEN FOOD BAGS AND WRAPS



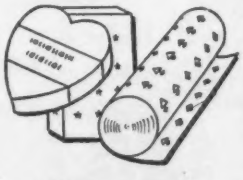
STOCK AND CUSTOM CELLOPHANE BAGS



FUNCTIONAL LAMINATED AND COATED MATERIALS



BOTTLE CAP LINING MATERIAL



HOLIDAY BANDS SHEETS AND ROLLS



FLEXIBLE LIQUID CONTAINERS



ELECTRICAL INSULATING MATERIAL



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PRODUCTS COMPANY

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THESE 3 SERVICES ARE AVAILABLE NOW



THE ENGINEER

Second, Shellmar engineers, working in one of the industry's most completely equipped laboratories, submit your product to extensive testing in conjunction with various functional materials.



THE TECHNICIAN

First, Shellmar packaging technicians, conveniently located throughout the country, will visit your plant and make a personal study of your packaging, handling and production problems.

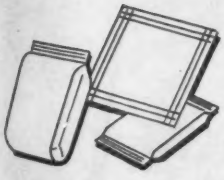


THE DESIGNER

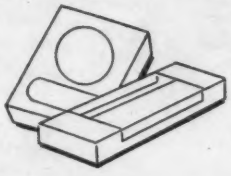
Third, Shellmar artists and package designers create a colorful and eye-appealing design to give your product outstanding individuality and insure maximum attention and display possibilities.

MATERIAL TO MEET EVERY PACKAGING NEED

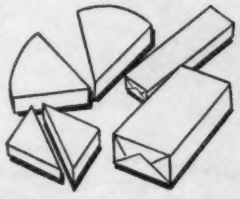




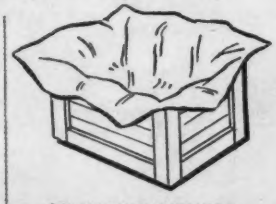
DEHYDRATED FOOD BAGS AND POUCHES



LAMINATED WINDOW CARTONS

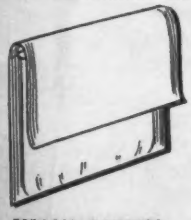


CHEESE POUCHES



PROTECTIVE SHIPPING CASE LINERS

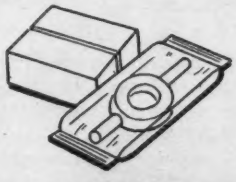




TOBACCO POUCHES



METHOD I MATERIALS



METHOD 1-A MATERIALS



METHOD II MATERIALS

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WAR BUSY NOW . . . BUT AFTER "V" DAY

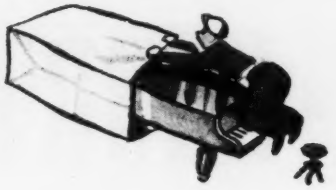
ASK FOR THILCO PAPERS

ES	DECKLE	BASIS WEIGHTS	COLORS	TREATMENTS
BAGS	Full range: Variety, Self-Opening, Odd bags, Duplex, Spec. sizes.	25 Lb. To 120 Lb.	Full standard range, bleached white, light tints, bright colors.	Standard types, kraft, glassine, waxed, printed, asphalt or wax laminated, wet strength, embossed.
ASPHALT PAPERS	60" Laminated 84" Laminated 120" Laminated 60" Coated	40 Lb. To 400 Lb.	Full Kraft range, bleached white, light tints, bright colors.	Plasticized, saturated, coated, laminated, designed, printed, creped, reinforced, wet strength, waxed.
WAX LAMINATED PAPERS	72"	45 Lb. To 200 Lb.	Full range — including Glassine and Kraff colors.	Combinations of all types Glassines, Greaseproofs, Sulphites, or Kraft papers.
WAXED PAPERS	72"	20 Lb. To 100 Lb.	Kraft — Tan, Special mill runs, Bleached and colors.	Wet waxed two sides, surface waxed one side, dry waxed, wax laminated.
PRINTED PAPERS	42" Aniline 48" Aniline 54" Aniline 53" Roto	20 Lb. To 120 Lb.	Full range, bleached white, light tints, bright colors.	4 color aniline or 2 color rotogravure, on Glassine, Greaseproof, M.F. and M.G. papers plain or treated.
EMBOSSED PAPERS	48"	20 Lb. To 120 Lb.	Full Kraft range, bleached white, light tints, bright colors.	Friction and standard types in stock or special patterns.
GLASSINE & GREASEPROOF PAPERS	Confer with mill.	20 Lb. To 40 Lb.	Bleached white, unbleached white, amber. Colors on M.O.	Standard grades and wet strength, opaqued Greaseproof, tub sized Greaseproof, plasticized.
SPECIALTY KRAFT PAPERS	120"	25 Lb. To 120 Lb.	Full Kraft range, Special mill runs in bleached, tints and bright colors.	Tub sized, oil treated, wet strength, water repellent, designed, supercalendered, mold-proofed, Water-finished, creped.
M.G. WRAPPINGS AND TISSUES	90" (Tissue) 92" (Wrapping) 120" (Wrapping)	10 Lb. To 120 Lb.	Full Kraft range, Special mill runs in bleached, tints and bright colors.	Striped, standard and special designed, wet strength, supercalendered, mold-proofed, anti-tarnish.

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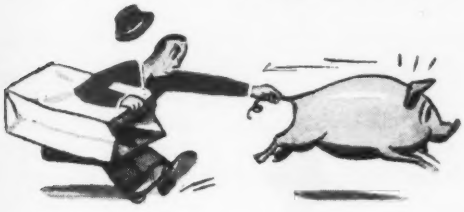
Or for Packaging Nutmeats



Or Peas



Or Pork Products





Today, one of Keller-Dorian's *functional* packaging papers protects grease packed, war-bound replacement parts from sea-air corrosion.

So why not protect piano—and other machinery—parts with this "war baby" in peacetime export trade? It's a plastic coated paper that is grease and moisture-vapor proof (M.V.T. of 1.3 grams).

And how about using it, or Keller-Dorian's aluminum-foil coated paper that is moisture-vapor, grease and lightproof to protect pre-packaged, processed or frozen meats . . . fruits and vegetables, fresh or frozen . . . and packaged foods of all types?

Keller-Dorian heat-seal *functional* packaging papers may be cut, scored and folded to fabricate any size, shape or style package to wrap. They may be printed or labeled. Their non-toxic coatings won't peel or crack, become brittle or tacky within a temperature range of 190° above to 50° below zero (F)

We'll match our time with yours to crack your tough packaging problems . . . and the chances are that our unique *functional* packaging papers, experience, techniques and thinking will help you develop better basic packages, liners or closures.

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FUNCTIONAL PACKAGING PAPERS *for Protecting Perishable Products*

• SHORT-SHORT STORY •

Complete on this page

READING TIME: 1 Minute *and* 40 Seconds

This is a story about something for nothing. The something is precision testing of packages—and you get it for nothing.

We sell glassine papers, but not all packages are made only of glassine paper. The packages which you use to pack frozen foods and dehydrated foods, baking mixes, wet prunes, etc. usually combine our materials with those of many other manufacturers. Test claims for packaging materials *per se* may mean little to you. What you need to know is how your *package* will act. Will it contain your product successfully? Will it have a sound structure for distribution and merchandising? Will it possess the necessary minimum of functional properties to deliver food in fine condition to the ultimate consumer?

Our laboratory answers these questions for you with actual tests of all types of packages. They test bags, cartons, wraps, fiber cans and various types of laminated containers both coated and uncoated. They will give you the actual facts on the various types of packages best for your product. They will tell you about costs of materials, of converting those materials, of the shelf life of your package, and, finally, of the consumer appeal of your package.

You probably know that material costs alone are not the basic factor. You must consider all of these points, in selecting your material and the type of package. For instance, an inexpensive material may have a high factor of conversion waste and, conversely, an expensive material may be cheaper to convert.

HOW

Here is how we work: You give us samples of your product in bulk and a number of your current packages which we use as control for comparison. We work with both the converter and the machinery manufacturer to devise a container or a series of containers to do your job. We then test these containers for the qualities listed above and we give you the complete unbiased results. Your guarantee that these results are unbiased is the fact that we have been performing this service for a number of years for some very important names in packaging who have been acting on our recommendations. We will be glad to give you these names on request.

Besides the obvious desire to sell our materials, we have a very good reason for performing these tests. We consider it a privilege to have the opportunity to test competitive materials against our own. We benefit by the results just as you do, because we are able constantly to improve our own products.

We offer this service—free testing and package construction — without any charge or obligation whatsoever, to all food and tobacco packagers, as well as to other industries.
We sincerely invite your inquiries.

•

WESTFIELD RIVER PAPER COMPANY, INC.

Russell, Massachusetts Telephone: Russell 16

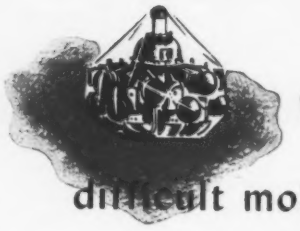
PRIVATE DESIGN



Nashua specializes in multi-color printed and embossed packaging papers — like the one shown above on the Necco box. A staff of experienced designers is at your service — no obligation, of course — to create an attractive, private design paper to suit your particular packaging problem.

PACKAGING NASHUA SPECIALISTS

MAKES PAPER MAKE MONEY FOR YOU



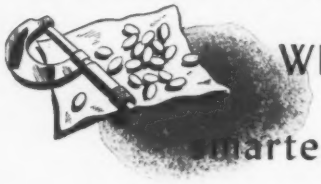
What solved the war's most difficult moistureproof packaging problem?



What keeps carrots garden-fresh for 18 months?



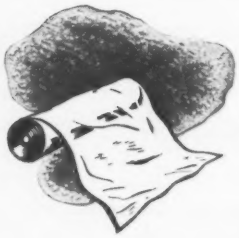
What's going to revolutionize fruit, vegetable and food marketing after victory?



What packaging will the smartest postwar merchandisers use on everything from precision instruments to peanuts?



To seal moisture *in*, or seal it *out*?



THE ANSWER, OF COURSE, IS

GOODYEAR
THE GREATEST NAME IN RUBBER

Pliofilm

A PRODUCT OF GOODYEAR RESEARCH

Let's all Back the Attack with War Bonds

Pliofilm—T. M. The Goodyear Tire & Rubber Company

With The Compliments of The Goodyear Tire & Rubber Company, Inc., Akron 16, Ohio



...akes fiber cans
...10 TIMES MORE MOISTUREPROOF

IT'S a fact, many moisture-sensitive products like cocoa, table salt and chemicals can be safely packaged at lower cost—in fiber cans with **Pliolite**-coated labels.

Humidity tests with table salt, for example, showed that a carton so protected absorbed only 86 grams of moisture in a given period while conventional cartons soaked in 1,330 grams during the same time—*a 93.5% reduction in moisture transfer!*

Pliolite is a solution, easily applied to paper, labels, glassine and other transparent sheetings and metallic foils. It imparts a high-gloss finish that adds eye-appeal.

Because it is heat-sealing, **Pliolite** simplifies the closure problem, making a strong, durable, moisture-air-tight weld.

It is clear, tasteless, odorless and scuff resistant. It can also be combined with wax for direct application to foods like cheese and for the coating of paper.

Today **Pliolite** is being used almost exclusively for military wire insulation. But you will be wise to investigate its possibilities now—for more economical post-war packaging. Write: Plastics and Chemicals Dept., Goodyear, Akron 16, Ohio.

PLIOLITE

...YEAR RESEARCH

Pliolite—T. M. The Goodyear Tire & Rubber Company

A PRODUCT OF

GOODYEAR

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BUY FOR KEEPS

A Complete LAMINATING and COATING SERVICE

Our facilities for the development of hot-melt coated and/or laminated papers and our experience in the production of this complete line are available to meet your most exacting specifications.

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Coated and/or Laminated

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Pulp Boards

Cellophanes

Glassines

Foils

Acetates

Cloths

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- ☐ Wrapping Papers
- ☐ Cotton Wadding
- ☐ Sheet lining—we supply board, fancy and plain papers—or work with your stock.
- ☐ Book-binding papers
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TEAR OUT AND MAIL

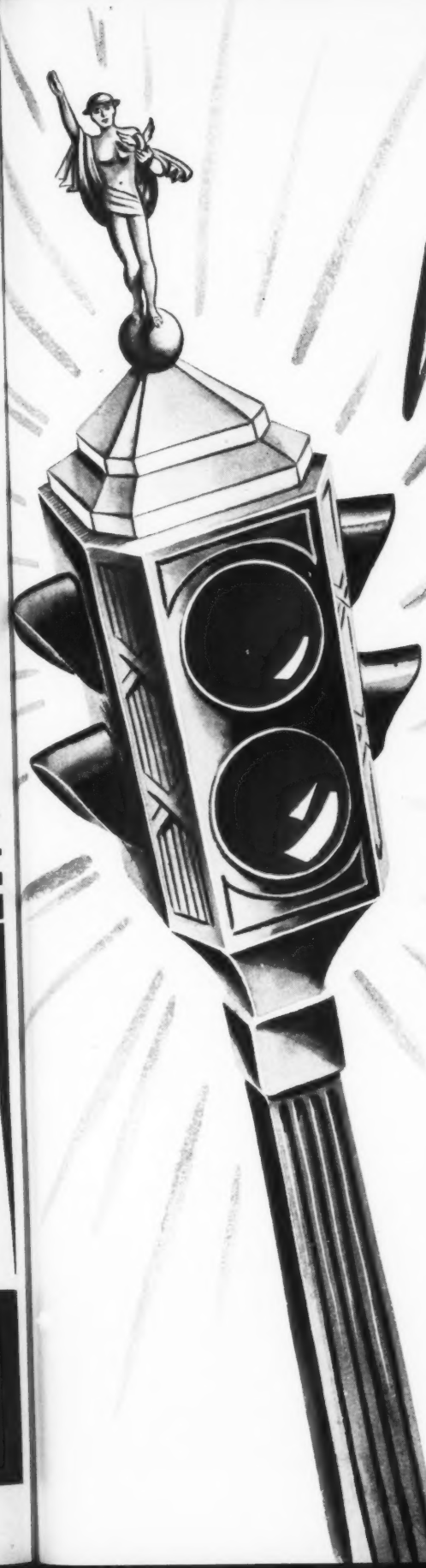
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AND
CELLOPHANE PRODUCTS

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Our war time experience should be helpful to you in peace time.

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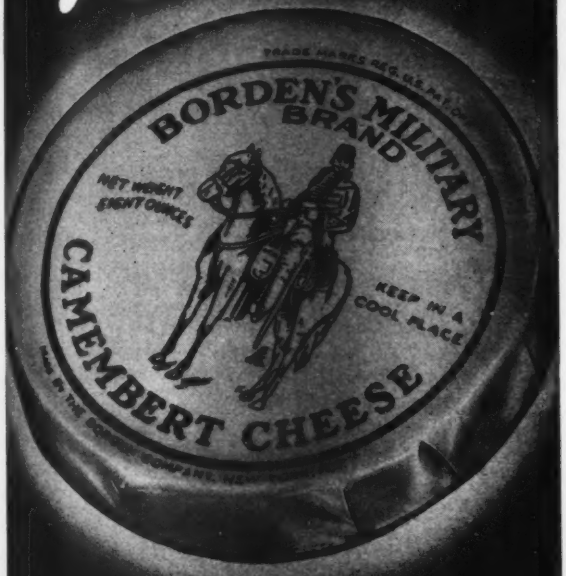
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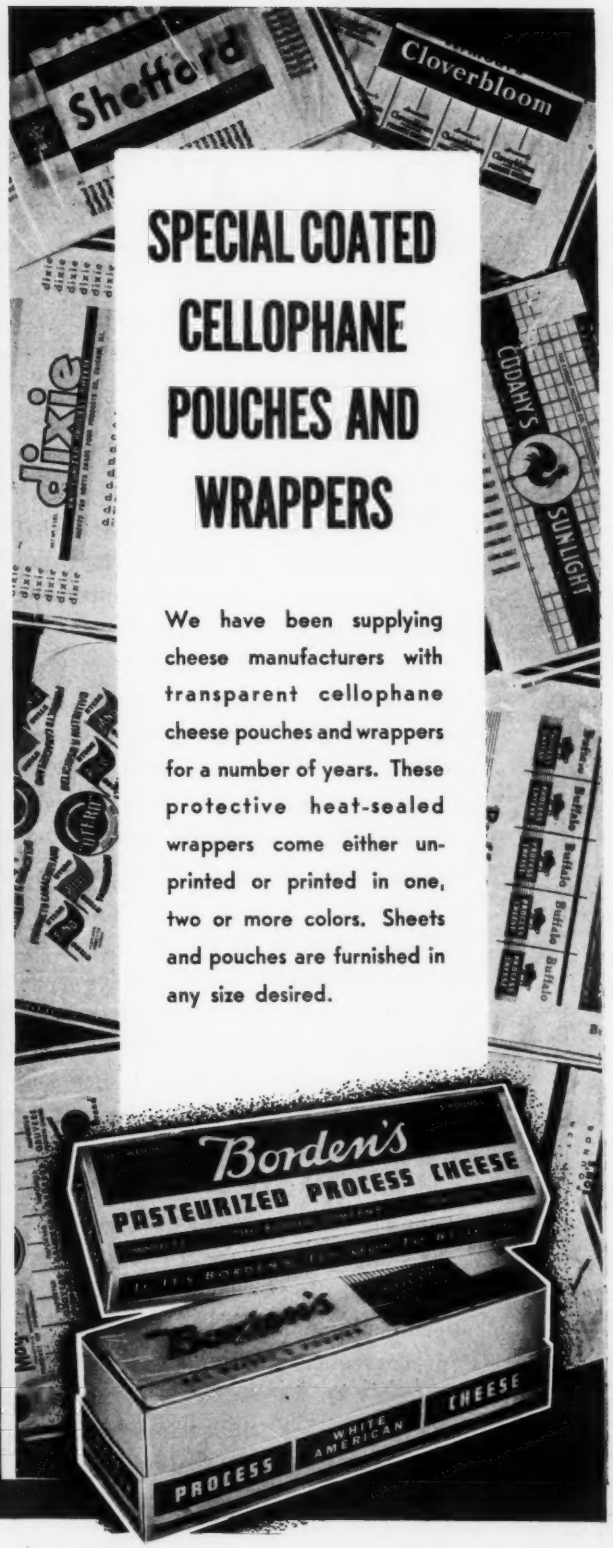


CELUMINA

Cheese Wrappers

FOIL-LIKE BRILLIANCE with CELLOPHANE PROTECTION

A beautiful wrapper... with the bright sheen of polished silver . . . and a strong protective coating . . . tasteless . . . odorless . . . tear-resistant . . . that's Celumina, a replacement for war-scarce foil. Celumina has many advantages. It handles easily, wraps fast, and withstands scuffing. It unwraps in one piece and can be re-wrapped. Attractively printed in one or more colors. For camembert, blue, process and other cheeses. Ask for samples.



SPECIAL COATED CELLOPHANE POUCHES AND WRAPPERS

We have been supplying cheese manufacturers with transparent cellophane cheese pouches and wrappers for a number of years. These protective heat-sealed wrappers come either unprinted or printed in one, two or more colors. Sheets and pouches are furnished in any size desired.

GENERAL FELT PRODUCTS

DIVISION OF

STANDARD CAP AND SEAL CORPORATION

68 THIRTY FIFTH STREET, BROOKLYN 32, NEW YORK

BASE PAPERS *for use in*

IN 1934, S. D. Warren Company committed itself to a program for the development of base papers for use in a variety of converting processes. The tasks of appraising the needs of the converting trades and applying research for the fulfillment of those needs were then assigned, and were thereafter progressed with care and deliberation. When war came, the Warren Company had accumulated an appreciable volume of business among convertors who were serving the commercial needs of a peaceful nation.

War speeded the development program. The increased demand for base papers for various processing needs accelerated the manufacture of such papers at the Warren mills. Convertors served by the Warren Company absorbed the increased production, diverted it largely from the civilian trade, and employed it to fill military needs. Since 1942 all such production has been allocated to the company's established convertor customers for uses related directly to war and the essential supports of war.

In consequence, the end of the German war will find S. D. Warren Company with a line of tested base papers, with an appreciable capacity for manufacturing those papers, and with a well-founded research experience in the development of new papers — all of which will be available for serving the peacetime needs of convertors.

Processing Possibilities

Base papers have been developed and manufactured by S. D. Warren Company especially for the processing operations listed herewith:

Pyroxylin lacquer coating
Synthetic lacquer coating
Wax and Hot Melt coatings
Resin impregnating
Gumming
Coating with light sensitive substances
Water solvent coatings
Laminating
Carbonizing

The base papers available for these purposes are adjusted to varying requirements of different processors.

Fields of Use

Warren base papers are currently being employed by convertors for the completion of these products:

Bags to hold liquid contents in freezing operations
Greaseproof wraps and bags
Rigid plastics
Water resisting papers
Paper printing plates for use on duplicating machines and small lithographic presses

CONVERTING PROCESSES

Gum and candy wrappers
Soap wrappers
Box coverings and labels
Paper for interleaving rubber
Bag liners and bags
Greeting cards
Envelopes
Wall board liner
Foil laminating and backing papers
Tight-wrap packaging
Gummed labels
Decorative wraps
Decorative cover papers
Papeteries
Blotter facing
Carbonizing tissues

Standard Products

The Copsecook Mill of S. D. Warren Company (at Gardiner, Maine) manufactures fine quality lightweight tissues exclusively. Warren's Cumberland Mills (at Westbrook, Maine) manufacture papers in normal weights.

In combination, these mills manufacture coated and uncoated base papers to standardized specifications that have been proved advantageous for designated converting uses.

Research Assistance

Over a period of years, the Warren Research Laboratory has developed numerous papers to meet common and uncommon needs — and these papers are available to convertors. If and when a converting requirement cannot be properly served by an existing Warren base paper, research effort may be applied to the end that a proper paper may be perfected and supplied.

However, experience has made it clear that research can be effective only when full information is available. Predetermined specifications are seldom of aid to research, and frequently prove to be obstructions. The information that is required is a detailed exposition of processing procedures and of all the conditions of ultimate use. When such information can be secured, the possibilities of development can be properly appraised, and the efforts of the Research Laboratory can be employed with good effect.

To those convertors that require sound scientific assistance in the creation of base papers and in the developing of processing methods, the assistance of the Warren Research Laboratory is available.

Warren's STANDARD Printing Papers

Better Paper . . . Better Printing

★

S. D. WARREN COMPANY
BOSTON 1, MASS.

LUMARITH*

A Celanese® Plastic

For

COMBINATION WRAP



TRANSPARENT BAG



PROTECTIVE COVER

Lumarith is a complete packaging plastic. It is obtainable in sheets and molding materials as well as films, foils and tapes. Crystal clear transparency and toughness make Lumarith the answer to many types of packaging problems.

WRAPS—Lumarith is the perfect transparent wrap. It is dimensionally stable, and provides a positive barrier to oil and water and will not block. Lumarith-wrapped merchandise is never found on the "as is" counter. The protection it gives to merchandise, and the glamour it adds, results in substantial savings in marketing costs. Sales of ordinary household and utility items jump when they are given the "lift" of a Lumarith transparent wrap.

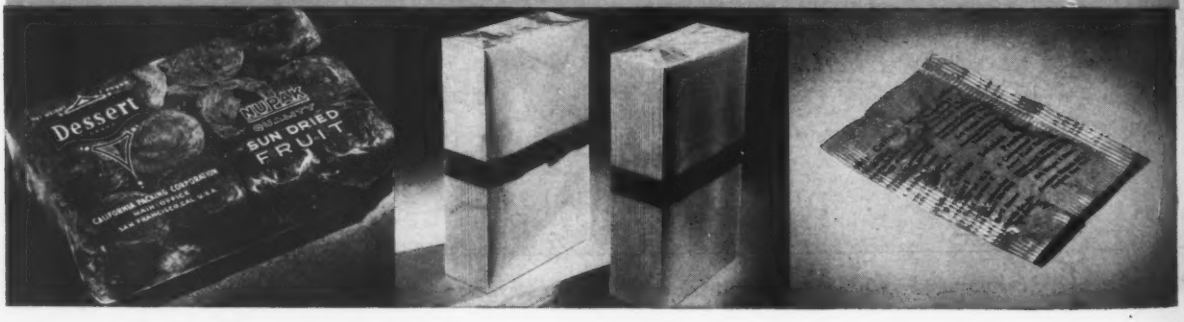
COMBINATIONS—The war has given impetus to the combination idea. Packaging specifications for supplies, intended for shipment to all climates and subject to alternating condi-

*Reg. U. S. Pat. Off.

LUMARITH* C.A.
Cellulose Acetate

LUMARITH* X
High Acetyl Cellulose Acetate

CELANESE PLASTICS CORPORATION
180 Madison Avenue, New York 16, N. Y.
A Division of Celanese Corporation of America



FILMS and FOILS

Wraps



LAMINATIONS

tions of heat and humidity—cold and dryness, frequently were too tough for any one material to meet. However, it was found that combinations could do the job. Lumarith films and foils became a part of many combinations: Lumarith with kraft paper and inhibitor coatings—Lumarith with metal foil and vinyl—Lumarith with vinyl and cellophane. The combination idea is destined to grow, and the properties of Lumarith indicate that this Celanese material will continue in high favor for this purpose.



TRANSPARENT WRAP

TAPES—Pressure-sensitive Lumarith-backed tapes fill a host of useful roles in the packaging field. The dimensional stability of Lumarith improves adhesion qualities. Lumarith has an excellent printing surface. Luminous ink can be used for visibility of printed matter in darkness. Lumarith tape provides a watertight, non-aging, non-drying seal and is ideal for use with transparent containers.

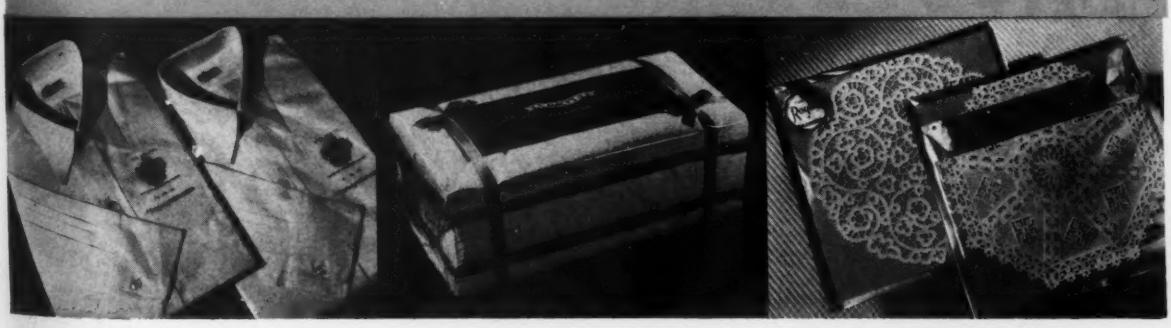


PRESSURE-SENSITIVE TAPE

LUMARITH* E.C.
Ethyl Cellulose

CELLULOID*
Cellulose Nitrate

See Other Lumarith Advertisements, pages 286-287, 602-603



"...It's a great idea but where will you get your material?"

When MODERN PACKAGING was started 18 years ago, it was such a new thought in publishing, that one of the leading manufacturers of packaging equipment told the publisher "It's a fine idea but you will run out of editorial material inside of a year."

Interestingly enough, his company is now entering its 18th year of advertising in MODERN PACKAGING!

Things have never stopped happening. MODERN PACKAGING'S staff of experts sifts and weighs a great pile of facts and events each month. For only the most important deserve inclusion in the pages of packaging's authoritative medium.

A constant stream of events indicates an active market. The consistent readership of leaders of industry (A.B.C. paid at $5.00 per year) centralizes the core of intense activity—the buying of some $5,000,000,000 worth of packaging materials and packages—in one market presented by MODERN PACKAGING MAGAZINE.

Space rates and circulation data on request.

MODERN PACKAGING MAGAZINE

PUBLISHED BY BRESKIN PUBLISHING COMPANY
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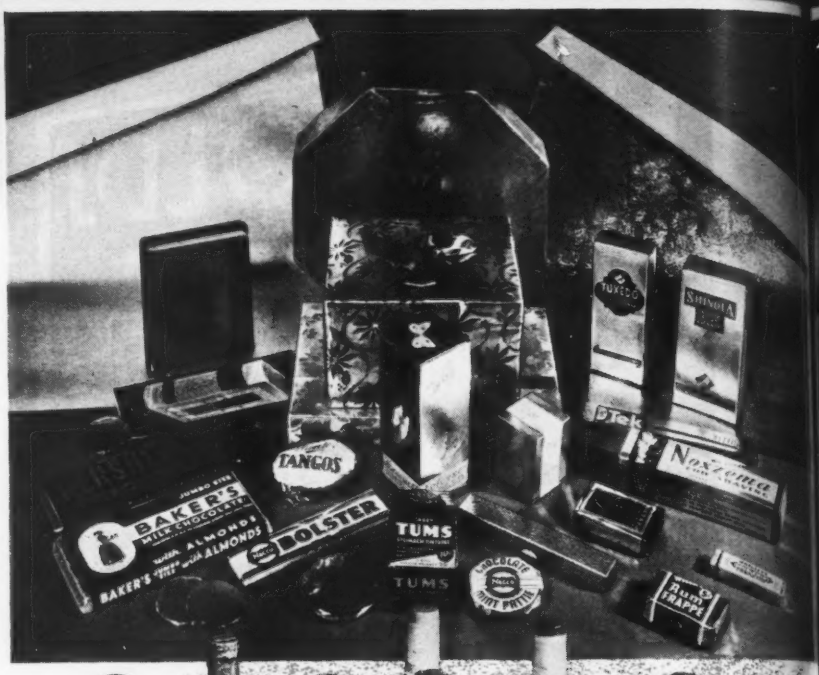
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LEADER IN FOIL PACKAGING!

Before the war... Reynolds Foil Packaging

...protected
...attracted
...sold



ON THE SHELVES of every retail outlet in America, the rich sheen of Reynolds aluminum foil packaging made a sparkling, unforgettable picture with its limitless range of colors printed, lacquered or embossed on foil's gleaming surface.

Foil offered *proved protection*, too—for cigarettes, chewing gum, chocolate, cheese—keeping light and moisture out, holding original flavor in.

Foil labels adhered tightly to bottles, even under water—never became messy and dog-eared from handling . . . pioneered a new era in brand-name protection.

Foil bags guarded peanuts, potato chips, and other foods against rancidity due to light, air, and heat.

Before the war thousands of manufacturers discovered the power of Reynolds Foil—to *protect*—to *attract*—to *sell!*



In "battle dress"...Reynolds Foil Packaging ...safeguards equipment and supplies



AT THE CALL OF WAR, Reynolds turned to the stern duty of helping deliver vital supplies and equipment to fighting fronts all over the world. In co-operation with Government Authorities, revolutionary developments in packaging were achieved. A composition of various materials laminated to foil has produced a flexible packaging material that meets all these Army-Navy requirements:

1. Positive protection against moisture-vapor transmission. 2. Immersion-proof. Keeps water out! 3. Protection against light and foreign odors. 4. Effective in extremes of temperature. 5. Safe protection for long storage periods. 6. Saving in tin, steel and other strategic materials. 7. Saving in shipping weight. 8. Serviceability under trying export conditions.

Reynolds is now furnishing armor-clad protection to thousands of items . . . from medical tablets to one-ton generator plants.



XUM



In the Post-war Era

REYNOLDS PACKAGING will have all the *sales allure* which only aluminum foil can give—

PLUS

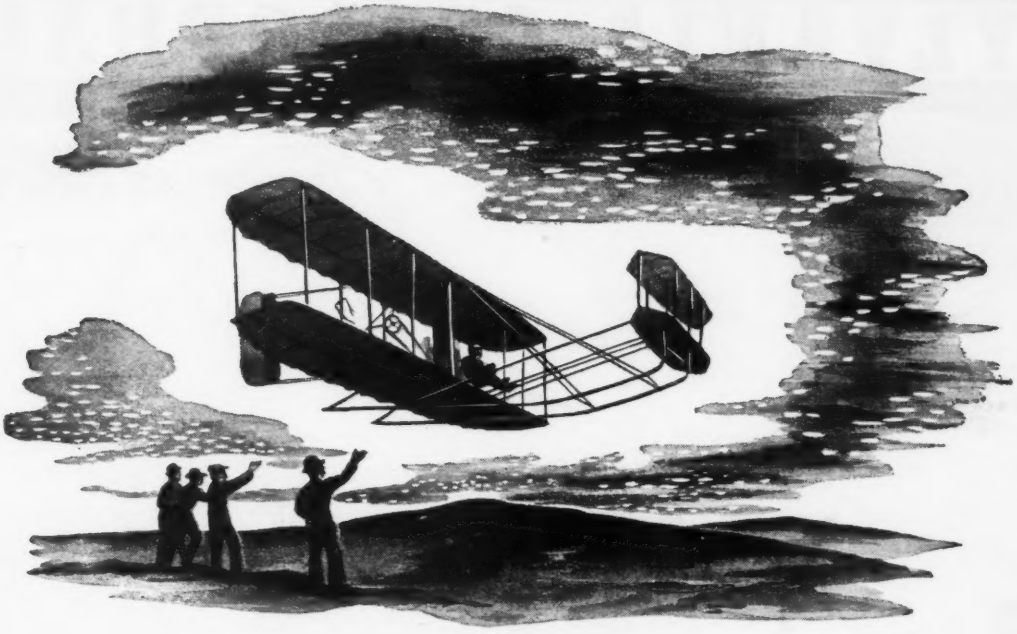
new protection and *extra values* to bring your product to the consumer in better condition than has ever before been possible.

Our laboratory is constantly working to apply the lessons war has taught to the problems of post-war packaging. These developments cover every field where packaging is important to sales results.

To learn how foil can help *you* in your post-war packaging write to:

REYNOLDS METALS COMPANY, RICHMOND 19, VIRGINIA

LEADER IN FOIL PACKAGING!



PIONEERS

We are pioneers in selling special papers for packaging to war plants in the territory we serve. Months before Army-Navy specifications ruling on the use of non-corrosive, moisture-proof papers, our executives and packaging engineers were calling on war plants, demonstrating, recommending, proving to buyers and shipping room heads that the use of protective packaging was an absolute necessity if parts were to arrive in working condition in far-flung corners of the globe.

Yes, we are mighty proud, here at Criterion, of our hard earned reputation as pioneers in the wartime packaging field and our customers and mill connections can count on us to continue pioneering in developing newer, cheaper, more efficient ways to

"DELIVER THE GOODS"

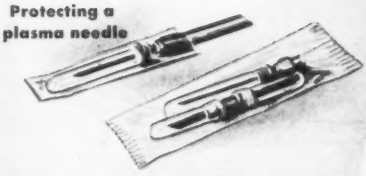
Criterion Paper and Twine Co.

799 WASHINGTON STREET • NEW YORK (14), N. Y.

SYLVANIA CELLOPHANE



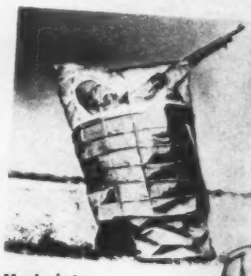
Proven in WAR...



Protecting a plasma needle



Guarding field rations



Made into anti-gas capes





Protecting gas masks

Protecting ammunition

Ready for PEACE!

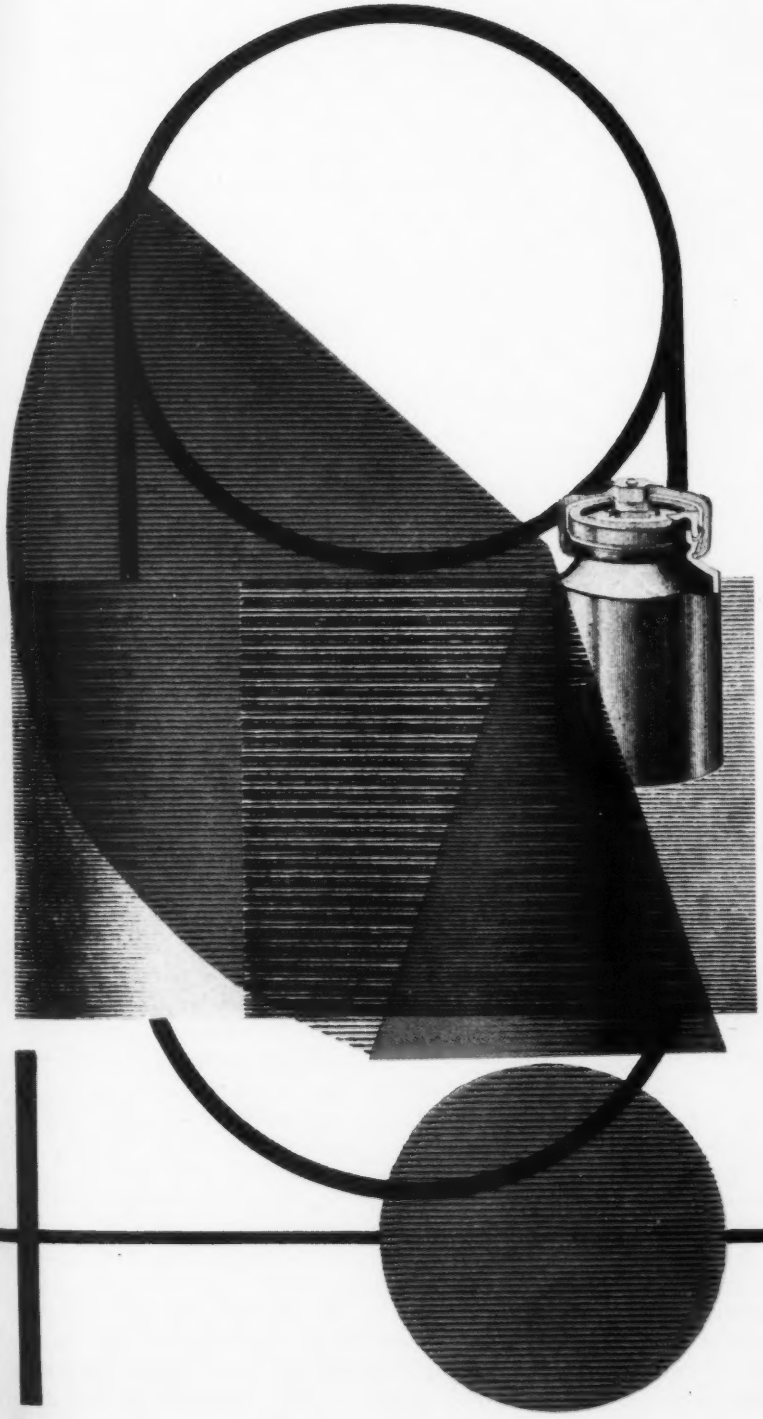
There is a distinctive, colorful Sylvania Cellophane for every packaging requirement. Sylvania's experience allows us to offer a cellophane for every purpose possessing any combination of these characteristics.

- AIR TIGHT
- HEAT-SEALING
- GREASEPROOF
- FLAME RESISTANT
- DUST PROOF
- MOISTURE PROOF
- RESISTANCE TO LOW TEMPERATURE

Our Research Department is maintained to help you now in the development and improvement of your packaging and to give expert counsel on the rapidly expanding industrial uses for Sylvania Cellophane.

SYLVANIA CELLOPHANE

CANS AND TUBES



Metal cans 478

Bonderite coating for metal cans 481

Future of electrolytic tinplate 483

Handling cans on the production line 485

Can decorating 487

Fibre-bodied cans and tubes 489

Paper cups and cans 492

Collapsible metal tubes 494

Coatings for collapsible tubes 496

Metal cans

by Gordon Cole

The year 1945, in the opinion of many metal can manufacturers, will see the beginning of a gradual return of this package for many foods and other products which have been packed in substitute containers during the war. The necessary control orders have restricted the use of the familiar "tin can" to only the most essential fruits and vegetables, for the most part, and when at all possible even these producers have been asked to use large sizes and even to go to other forms of packages, in order to conserve precious tin and steel.

Expectations are that the first products which will probably return in metal containers will be dentifrices, drug products, tobacco, such dry foods as crackers and cookies, spices, baking powder, cocoa, grated cheese, and certain household products like waxes and cleaners. Not long in following them will be paint, coffee and shortening. Before too great an interval, the metal can will again be performing its wide variety of services in packaging an infinite variety of products.

This type of package has a long history to its credit. Since 1820, when William Underwood in Boston and Thomas Kensett in New York started the first commercial production of canned foods in the United States, the use of tin cans as containers for foods and other products has steadily grown in volume and variety in this country. The extent of that growth is indicated by the fact that in the last 30 years the average annual U. S. per capita consumption of canned goods has increased from 17 to 130 cans. Previous to Pearl Harbor, the civilian populace was opening, discarding and replacing 45,000,000 tin cans daily—a total of approximately 17,000,000,000 cans a year.

Apparently, the average American has taken the "tin can" completely for granted. It has brought his favorite food to his table in season and out—it has helped cure his headaches via the aspirin tablet and has delivered the best grade of motor oil to his automobile, untampered with from the day it left the refinery to the moment it was poured into his automobile engine. But has he ever given the "tin can" the credit? There is much to indicate that he hasn't consciously done so.

When the present war is over, the situation may be quite different. Total war is a highly exacting taskmaster. It demands the best of men, machines and materials. It commandeers from civilian life those men, machines and materials that can serve the war effort best. It says to the civilian populace: "We have taken all or most of this product because it is ideally suited to our purpose. The enemy will not wait until we have developed an acceptable substitute. You will have to get along without it until the war is over or until production can be increased so that after our needs are filled there is enough for you as well." This has happened to many products in this war, including "tin cans." Possibly no other circumstances could so effectively impress the virtues of a product upon a nation of people.

What are the virtues that have made the "tin can" such a highly satisfactory container in peacetime and so vitally essential a container for our Army, Navy, Marines and Coast Guard in wartime? The accompanying list shows that they can be stated in simple words.

Convenience—Easy to store, easy to carry, easy to handle, easy to open, easy to heat, easy to ice, easy to dispose of.

Safety—It keeps in vitamins, minerals, flavor, color. It keeps out light, air, moisture, gas, dirt, germs.

Strength—It is hard to break, tamperproof, nonporous.

Economy—It costs little to make, is inexpensive to label, to ship, to handle, to display.

Preservation—It provides, especially for foods, year-round variety, high nutritive values, peak of quality.

While these few simple words suggest a multitude of values, these values in turn point to one overall conclusion: the outstanding characteristic of "tin cans" is their versatility—versatility of values and versatility of uses. Never has this fact been so dramatically demonstrated as by the variety of services tin cans are rendering our armed forces today. These services break down into three main classifications: tin cans as food containers, tin cans as miscellaneous containers, and special war services of tin cans. It is estimated that two-thirds of all food our soldiers eat today comes out of tin cans.

To supply our invading forces in Europe, Asia and in the South and North Pacific, we must ship hundreds of items ranging all the way from clothing to gasoline and ammunition in containers that can withstand crash landings from the air, submersion in salt water, repercussions from shell fire, poison gases and extremes of climate encountered in a global war. Because tin cans are strong yet light, easy to handle and store—because they keep out gas, moisture, air, dirt and germs and are non-corrosive, they have been commandeered to do this job. They are being used to encase signal flares, bomb fuses, percussion caps, demolition bombs, blankets, fishing tackle for life rafts and hundreds of other items. In the Solomons and in the invasion of North Africa, Sicily and Italy, many of these items packed in airtight and watertight cans were floated ashore from ships.

Tin cans have been put to many new uses in the present war. Some of them are military secrets, but a few can be described. There is a portable still for life rafts which converts salt water into fresh water. This still is encased in a watertight and airtight can because its fuel must be kept dry or the still will not work. There is a can containing a chemical which, when opened and tossed from a life raft or boat, spreads a splotch of yellowish-green color over a large area of water. A pilot in a searching plane,

even at 10,000 ft., can spot this brilliant distress signal. There is a can which, when tossed into the water, inflates a balloon which soars 300 ft. into the air carrying aloft a radio aerial with the aid of which men shot down at sea can send out an S.O.S. from a portable radio. These, and many other uses that tin cans have been put to in this war, serve to emphasize values and services peculiar to tin cans which in peacetimes most civilians have taken for granted.

Can manufacturers took on their full share of war work without any interference with their normal facilities for producing cans. They simply extended their activities and made use of warehouse space not currently needed for normal storage, in order to accommodate war production. Their conversion to war work was easy, quick and almost painless.

By the same token, reconversion will pose no great problems. Within a very short time, relatively speaking, the can factories can be turning out metal containers as before, with only one obstacle. Manpower will be the principal hurdle; but assuming that the can makers will get their share of men when demobilizing begins, this difficulty should not be great.

It must be remembered, however, that the can maker is a fabricator. One of his raw materials is the steel mill's finished product. The steel mills, too, must return to normal activity and be in a position to supply the requisite black plate. Subject to those two provisos, it is safe to predict a quick reconversion.

What of the present and the future so far as tin cans are concerned? Let us direct our attention to the present situation first. Because of the urgent requirements of our Army, Navy, Marines, Coast Guard and of Lend-Lease, the production of tin cans has been under rigid government regulation since February, 1942. In fact, so many cans have been needed for so many purposes that, with the exception of certain food products which the government has considered essential to civilian health and a small number of additional products which are also considered essential and which cannot be satisfactorily packaged in substitute materials, tin cans as containers have been prohibited for civilian uses. In normal times some five hundred or more different products are packaged in tin cans.

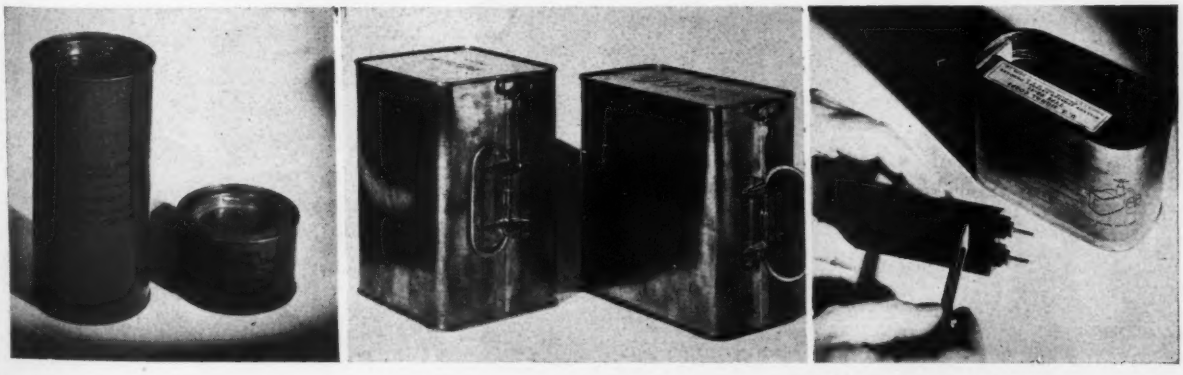
Today if a product falls within the 93 classifications listed in Order M 81 covering food products, or in any of the 50 classifications covering non-food products, it can be packaged in metal containers within certain government-stipulated limits as to quantity and to kind of container construction. The latest reports from all fields of container manufacturing indicate that, so far as the civilian market is concerned, there is a shortage today of all types of containers. Regardless of the cause—whether it be a lack of raw material, a lack of production facilities or of manpower—the fact remains that the era of substitution, when tin cans could be replaced with glass jars, or wooden boxes with paper cartons, is past. Except for essential foods and other high priority products, the familiar tin can has been on a long leave of absence. For many products, that leave of absence will be continued for some time at least. That does not mean that the can-making factories have been shut down—far from it. The production of metal containers for canned foods has been greater than under normal conditions. This can be verified by reference to the statistics of the National Canners Association which show increased case production in metal of processed fruits and vegetables in practically every type of line.

Despite these increases, the civilian share of canned foods must for the time being be decreased. Of the 1944 pack, the War Food Administration has ordered increased "set asides" for government reservation amounting to 42.3 per cent of canned vegetables and 72 per cent of the 14 principal canned fruits. This obviously means a reduction in the civilian share, but no civilian will complain because his portion is cut down when he knows that this means less than three-quarters of a can of fruits and vegetables each day for each fighting man, and when he remembers that the soldier's principal reliance for food is upon the canned product. Nor will civilians complain because cosmetics, paints and other products are temporarily denied the use of tin so as to increase the supply of metal containers for military use.

The future, of course, presents quite a different picture:

1—Charge container for hydrogen generators used to inflate meteorological balloons. Body of terneplate, top and bottom of Bonderized steel. 2—Ammunition container with sturdy handle, extra-large key firmly attached. Made on base formerly used for olive oil, anti-freeze, etc. 3—Principle used in packaging foods now employed by American Can to vacuum pack Willard storage batteries for Army Signal Corps. Photos, Can Mfrs. Institute.

1 2 3



in normal times it is a fundamental truism that the product will be in demand which best serves the consumer at a price that is economically sound. Because tin cans have so definitely demonstrated their many and varied virtues in peace and in war, hundreds of items going to the civilian market will again be packaged in them. Many of these items will be products formerly packed in tin cans, many will be new items manufactured by firms that have discovered the virtues of this container as a result of its many new and highly successful applications as a weapon of war.

Because production lines which turned out peacetime containers are intact, because so many of the war items now manufactured by can companies are coming off the same machines that turned out peacetime containers, tin cans for the civilian market will quickly be available once the war is over and the restrictions have been lifted on raw materials.

The question has been asked whether former users of metal containers, now denied them, will abandon substitutes and resume the use of tin cans. As everybody in the packaging field knows, products like coffee, shortening, paints, lubricating oils and cosmetics have been using substitute packages because of the imperative need for conserving metals. Judging, however, by the number of producers in those fields who are constantly asking the Can Manufacturers' Institute—and no doubt every individual can manufacturer too—when they can get metal containers, there is no basis whatever for any question about the future of the metal package. It would seem that the long leave of absence has merely served to arouse a keener desire, on the part of the packager as well as on the part of the merchandiser and the ultimate consumer, for the familiar tin can.

There will doubtless be a few products which for one reason or another may not come back to tin. On the basis of the economics of marketing and distribution, the vast bulk of processed foods will contine to appear in the form of package which offers great convenience and service value at lowest cost.

The can manufacturing industry, in spite of its extra responsibilities, has not allowed its research program to stand still. Rather, the needs of war have served to accelerate certain important developments. Many of these projects were well under way prior to the war. For instance, the can manufacturers have always worked very closely with the steel mills with respect to formulation of metals to produce certain results. Considerable progress has been made as to the ductility of the basic plate used for cans. At the same time, the can companies have spared no expense in cooperating with the steel companies in perfecting methods of electrolytic coating, the results of which have been a tremendous conservation of tin. Tinplate carrying these lighter coatings of tin will have a permanent place postwar. Its extent still has to be established. The same qualifications might apply with equal weight to other substitute coatings. But when the full story of the research efforts of the industry can be told, it will present a most impressive picture—one which includes development of new alloys, methods of soldering, experiments with sealing compounds, corrosion prevention and numerous other projects. The prospect should reassure producers of packaged products, for unquestionably the metal container will continue to serve the consuming public in many ways.

The war has given impetus to the trend toward standardization of metal container sizes. The can manufacturer views this trend almost from the standpoint of a bystander. He is in the business of making containers, and his equipment will produce whatever his customers demand. From the standpoint of conservation of materials and consumer convenience, standardization has certain advantages. Whether in normal times these advantages will offset the equally obvious advantages of package individuality, is a question which must be decided jointly by producer and consumer. A wholesome competitive economy can be counted on to make sure that the ultimate consumer will get all the benefits of mass production. The can manufacturer stands ready to produce the kind of packages needed.

4—Such beer cans as this, which will return for civilian use after the war, now carry emergency drinking water in life rafts. 5—The old sardine can is now carried in flyers' seat packs to hold concentrated foods for the use of men who are shot down over water. 6—These special wartime metal containers are used as a part of the soldier's gas mask to hold the chemicals which filter out fumes of poison gas. Photos, Can Manufacturers' Institute.

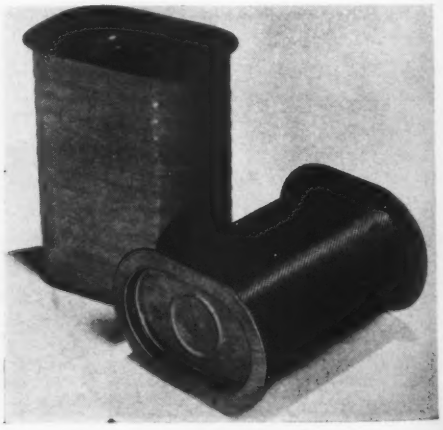
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5



6



Bonderite coating for metal cans

The use of Bonderite as a coating for metal cans received a great impetus because of the war-induced shortage of tin. The Bonderizing process had been well known in the automotive industry previous to its introduction into the packaging field. To adapt it to packaging uses was merely a matter of developing equipment to make it commercially practical. The process has now thoroughly demonstrated its rust and corrosion proof effectiveness; and, in view of the fact that the tin supply will be very critical for some time after peace comes, without a doubt Bonderite will continue to serve for a long time.

Fortunately, the supply of tinplate, the special form of sheet steel used for metal cans, is not so critical, and our sources are in this country. Bonderite-K is a solution, the main constituent of which is phosphorus, applied by a process to be described in a moment. It is a dull gray in color, and at first it was feared that the housewife might object to it. It has proven no hazard, however, probably in part at least because the housewife has learned to take almost anything. A coating of lacquer on top of the Bonderite provides full protection against corrosion, and the gloss and color present an attractive appearance.

Cost comparisons have not been fully worked out. It is quite possible that Bonderite coating plus the necessary lacquer may cost more than the familiar hot dip tin coating; but comparisons are really beside the point, for the perfectly sufficient reason that, for the time being, there just simply isn't any tin.

The operation of producing Bonderized steel sheets suitable for cans is completely mechanical from the time the sheets are automatically fed into the Bonderizing equipment. As the sheets or strips pass through a series of rollers, contained in the machine, the Bonderizing solution, which is supplied by the Parker Rust-Proof Co., is sprayed on the metal through a series of nozzles, which produces a fine-grained phosphate coating and will withstand the drawing, bending and rolling operations incident to the manufacture of cans, bottle caps, and similar packages and closures. The Bonderizing process takes only 10—15 seconds. Applied over a Bonderized surface, organic coatings provide a degree of protection that is not possible on untreated steel surfaces. In addition, Bonderizing provides a degree of protection from rust to the steel sheets on their way from the steel mills to the can factories.

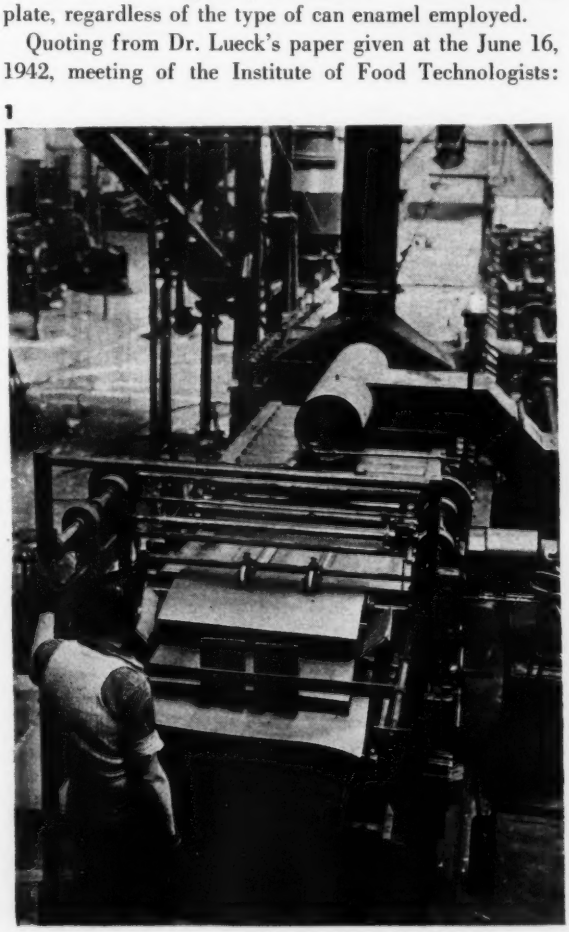
Thousands of test packs have been made with all kinds of fruits and vegetables under the usual and extreme conditions of canning and storage. Canners and can manufacturers have been making test packs with Bonderized cans and subjecting them to tropical, sea atmosphere, and other severe and normal tests. The results have been so satisfactory that Bonderized steel is now accepted for many foods, as well as certain rations for the Army.

Both the American and Continental Can companies have been especially active in this development. Through the courtesy of Dr. Roger H. Lueck, Director of Research of the American Can Co., the illustrations on p. 482 show the results of some of this company's tests on Bonderized and non-Bonderized cans.

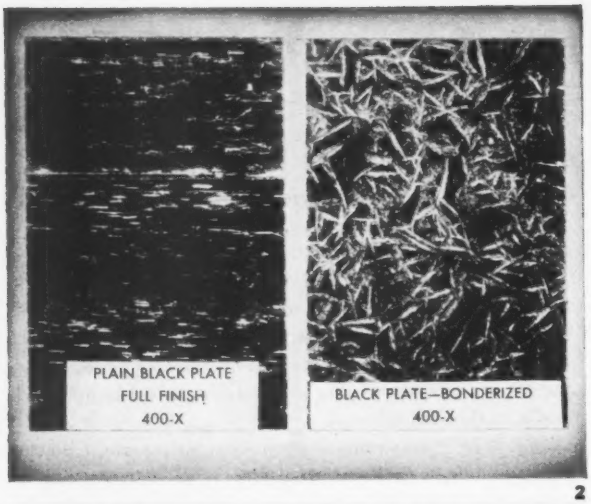
Fig. 2 is a microscopic study comparing plain blackplate, at left, with Bonderized blackplate at right. Fig. 3 shows the result of a thermal processing test made on two cans, one of Bonderized steel and one of untreated deoxidized steel, both finished with the same organic coating. The can at right illustrates underfilm corrosion, a mass of hairline rust formation which develops under clear organic films applied to untreated steel when exposed to the atmosphere. The rate of formation is dependent on the humidity and the moisture-vapor impedance of the organic film. As shown in the can at left, this effect is completely eliminated with Bonderized plate, regardless of the type of can enamel employed.

Quoting from Dr. Lueck's paper given at the June 16, 1942, meeting of the Institute of Food Technologists:

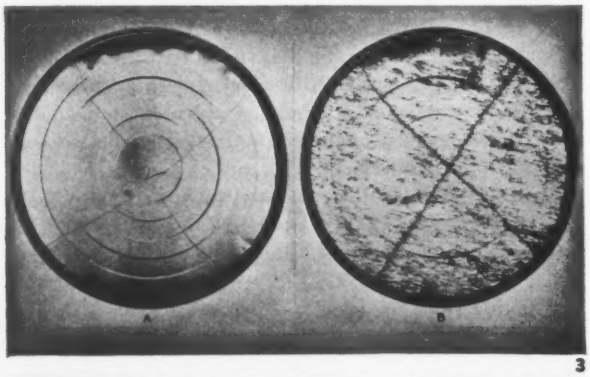
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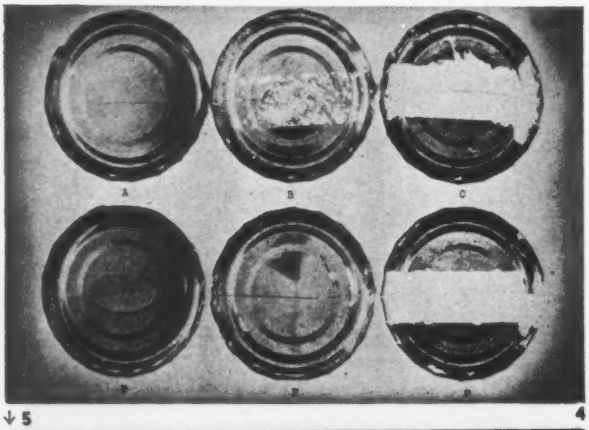
1—Sheets of tinplate feed into Bonderizing unit reminiscent of a printing press. Coating retards corrosion, provides a base for lacquer finish.



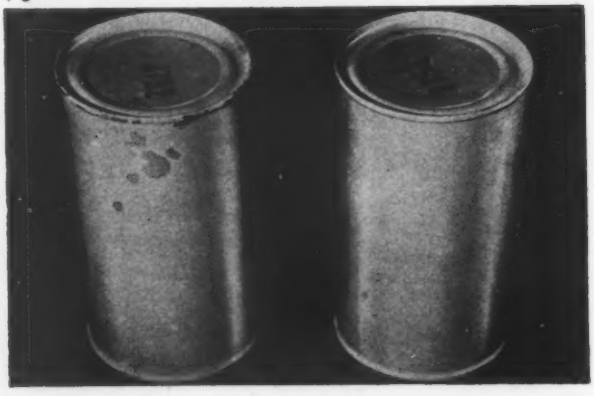
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↓5 4



"On the inside of the can the effect of Bonderizing the steel surface is especially apparent. There, without the phosphated substrate, all organic films, some more than others, undergo a loss of adhesion in contact with most foods, particularly during the thermal sterilizing process. Any loss of adhesion is followed by rapid corrosion of the steel, resulting in hydrogen swells, discoloration and the presence of enamel particles in the food."

Fig. 4 is shown to illustrate the effect of the Bonderizing treatment on adhesion of coatings on the inside of cans, the adhesion being determined semi-quantitatively by the cellulose-tape test applied to the film after the can had been emptied and washed. In Fig. 4 it will be observed that adhesion is still effective on A (the Bonderized sample) only partly effective on B (phosphoric acid treatment) and very poor on C (deoxidized steel) as the cellulose tape lifts practically all of the organic finish. D, E and F show the results of the same test applied to double organic coatings on, respectively: Bonderized steel, phosphoric acid treatment and deoxidized steel.

Figure 5 shows effect of surface treatment on the adhesion of protective coatings on the outside of cans, with deoxidized steel, at left, compared with the Bonderized steel, shown at right.

Since the first pilot machine was installed several years ago in the Carnegie-Illinois plant at Gary, more than a score of huge Bonderizing machines have been placed in operation in various steel mills. Thousands of dollars are already invested by can manufacturers and steel mills in equipment for the application of Bonderizing and supplemental organic finishes.

On a typical automatic Bonderizing machine, the stacked blackplate is mechanically fed in at the rate of 120 ft. per minute. Running through rubber rollers, the deoxidized sheets are subjected to the Bonderite-K chemical for 7 seconds; then are put through a cold water rinse and finally through chromic acid.

Investigators estimate that at the present consumption rate the visible world supply of tin will run out in about 20 years. Even after the present Pacific situation is cleared up and the tin deposits now held by Japan are released to normal channels of trade, they say that not only must the visible supply be used sparingly, but search must be made for new deposits and use must be made of every available method of tin conservation that will provide comparable protection for metal containers, at least temporarily. The end of the war will not suddenly permit return to complete freedom of the use of tin, as time will be required to reopen mines, re-establish trade channels and facilities.

2—A 400-power magnification compares Bonderized (right) with plain blackplate. 3—Underfilm corrosion tests show untreated deoxidized steel (right) with rust formation. Bonderized (left) is unaffected. 4—The effect of surface treatment on the adhesion of single coatings (top) and double coatings (bottom). A and D are Bonderized; B and E are phosphoric-acid treated; C and F are plain deoxidized steel. 5—The effect of surface treatment on adhesion of outside coatings shows poor results on deoxidized specimen (left). Bonderized can (right) is unaffected.

Future of electrolytic tinplate

by Kenneth W. Brighton

As their contribution to the Tin Conservation Program, the steel mills of this country have constructed 26 electrolytic tinplate lines at a cost of almost 50 million dollars. The product from these lines is doing a good wartime job in cans for many fruit, vegetable, meat, and fish products, as well as for many non-food commodities, and it can be said that the use of electrolytic plate has permitted a significant stretching of the amount of tin allocated for containers. However, at the end of the war tin will again become available, and there is considerable interest in the matter of what will then happen to electrolytic plate.

Before the war the small quantities of 0.5-lb. electrolytic plate then available were used for the non-thermally processed or general line cans such as coffee, candies, biscuits, etc., and it is expected that at the end of the war the bulk of the 0.5-lb. electrolytic plate will again go into general line cans.

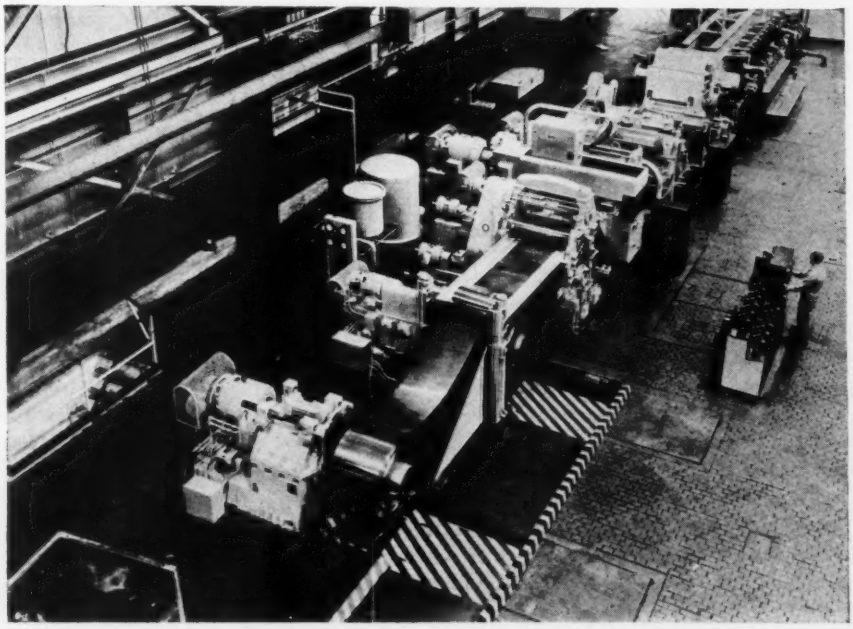
The 26 electrolytic lines now, or soon to be, in production are expected to have an annual capacity of over 40 million base boxes. In 1941, the biggest year to date for the can manufacturing industry, all general line cans required only about 20 million base boxes of plate, so there may be considerable electrolytic plate capacity left over for packers' or thermally processed cans. However, the postwar studies made by the manufacturers of cans, the users of cans, and by independent agencies agree that within a few years after the war the number of general line cans packed will be larger, probably significantly larger, than in the prewar period.

The studies which predict an increased number of general line cans after the war also indicate that considerable competition between the various types of packaging may exist. Under such conditions the availability of the lower cost electrolytic plate may be highly advantageous.

The general line cans made of prewar 0.5-lb. electrolytic plate performed very satisfactorily under the favorable storage conditions which such cans in domestic distribution enjoy, and there is now hope that a tin coating lighter than 0.5 lb. BB may be applied on plate for cans for low moisture content products such as coffee, shortening, candies, etc., in the postwar period. Considerable improvement has been made in the internal corrosion resistance of electrolytic plate and it is thought that this improvement may also result in greater resistance to atmospheric rusting, and that a lower coating weight of tin may provide a performance equal to that of the 0.5-lb. coating applied before the war.

The general line food products of high moisture content are of such a nature that inside enameled 0.5-lb. electrolytic plate is necessary to provide adequate internal corrosion resistance. Cans made of inside enameled 0.5-lb. electrolytic plate are competitive in price with cans made of plain hot dipped plate and so may see considerable use in the immediate postwar period when the shortage of tin is still in existence. However, as the tin situation eases there is likely to be a return to plain hot dipped cans unless in the meantime the corrosion resistance of plain electrolytic plate is improved to the point where it may be used without inside enameling.

Beer is one general line liquid food product that deserves consideration. Beer cans were made of inside enameled hot dipped plate. *(Continued on next page)*

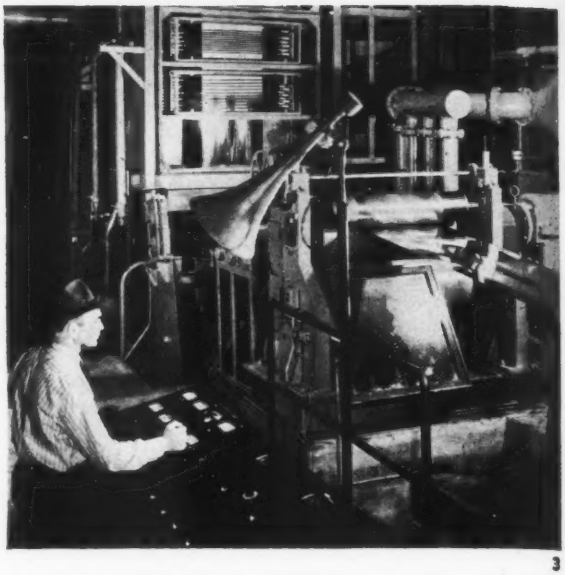


1—Beginning of electrolytic tinplating process. These lines can produce a lighter coating than can be produced by dip lines. Photo, American Can Co.



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2—Plating well in electrolytic coating line. Electrolytic tinplating makes available supplies of tin go farther. Photos, American Can Co.



3

3—Induction melting unit of electrolytic coating line. Electrolytic plate may eventually be used for packers' cans without inside enameling.

At the present time most of the beer being exported from the United States to the armed services is shipped in cans made of inside enameled electrolytic plate. There is considerable hope that in the postwar period an expanded volume of beer cans will be an important outlet for electrolytic plate.

Another class of general line commodities which should be discussed is the non-food industrial items. These are products such as oils, paints, cements, waxes, etc., for which lightly coated terneplate is applicable. (Terneplate is steel bearing a coating of terne metal consisting of 15 per cent tin and 85 per cent lead.) At present lightly coated terneplate sells at a lower price than 0.5-lb. electrolytic plate, so there is no reason to expect a rapid trend toward the use of electrolytic plate of that coating weight. However, a coating of tin lighter than 0.5-lb. may be competitive with terne plate and if it is found to perform satisfactorily, may gradually displace terneplate.

It was mentioned previously that there may be considerable electrolytic plate capacity available for the thermally processed vegetable, fruit, and other food cans which are known in the industry as packers' cans. Accordingly, considerable investigational work is now underway to see whether or not the corrosion resistance of electrolytic plate can be increased to the point where the cans can be used without inside enameling. Up to the present time, it has been necessary to inside enamel all electrolytic plate for thermally processed food cans, and the cost of the enameling operation tends to offset the savings resulting from the use of only 0.5-lb. tin coating instead of the 1.5-lb. tin coating used on prewar hot dipped plate. It is, therefore, likely that in the postwar period when tin is more available there will be some return from inside enameled electrolytic plate to plain hot dipped plate. The extent of the return will be largely dependent on the nature of the food product under consideration. During the war electrolytic plate has had its widest application for products such as peas, corn, etc., which before the war were largely packed in inside enameled hot dipped cans. If in the postwar period the internal corrosion resistance of 0.5-lb. electrolytic plate is considered satisfactory for processed cans, inside enameled electrolytic cans will provide competition for inside enameled hot dipped cans for such products as peas and corn.

A large number of cans made of plain 0.5-lb. electrolytic plate have been packed to determine the corrosion resistance of plain electrolytic plate. The results of the first packs had indicated that plain 0.5-lb. electrolytic plate would give only a short shelf life. However, recently results were obtained which provide considerable optimism about the future use of plain electrolytic plate for processed food cans. Certain samples of 0.5-lb electrolytic plate were tested which showed excellent corrosion resistance. The principal problem now facing the tin mills is, therefore, to learn why certain samples give superior performance, and then to raise the general level of corrosion resistance to equal that of the best samples. If this can be done, a real future exists for electrolytic plate in processed food cans. Indications now are that the 0.5-lb. tin coating may not be satisfactory, but at some higher coating weight, probably between 0.75 lb. and 1.0 lb. the electrolytic plate of the future may have enough corrosion resistance to be used for many processed products without being enameled.

After surveying the container field, the conclusion can be reached that a bright future exists for electrolytic plate in the general line field in the postwar period, and that there is also evidence that sometime in the near future electrolytic plate will be developed which can be used for packers' cans without inside enameling.

Handling cans on the production line

by Fred C. Baselt

In general, the handling of metal containers by canners simply calls for the exercise of good judgment and common sense. This is true for metal containers made in peacetime or for the wartime containers.

The metal container, or, to use the more familiar nomenclature, the can, is made of sheet steel (approximately 1/100-in. thick) which is usually coated with tin and sometimes with an additional coating of enamel. The materials and structure give the can many inherent advantages. It is ideal for high-speed operation, it is lightweight, moistureproof, vaporproof and lightproof and permits high process temperatures. A wide variety of sizes is available, it is economical, will not break or tear, and its character is well known to the public. Little can go wrong with a tin can which cannot be prevented with care.

1. See that the containers are not dented, bent or mechanically distorted so that a hermetic closure is not prevented or damaged.
2. Avoid the occurrence of rust or corrosion. Temporarily the industry is using wartime packages which, while performing satisfactorily, do not offer quite the same latitude as a prewar can in respect to corrosion. These cans demand that the fundamental principles of good canning be strictly adhered to.

Handling of cans is such a simple operation and the rules so few that the troubles incurred are generally due to gross neglect and extreme liberties. The contingencies which will be outlined here, it must be stated, are conditions which rarely prevail and represent exceptions rather than routine. The suggested precautions should eliminate the exceptions due to infractions of accepted practice.

Empty cans—Tinplate has excellent rust resistance under all ordinary conditions. However, under extreme changes in temperature, from cold to hot, condensation or sweating may occur. Moisture in this form can rust the container. For best results storage temperatures should be uniform and humidity should be low. In other words, the storage room should be properly heated and ventilated. The storage room or warehouse should, of course, be kept clean and the cans protected against dirt and dust, bearing in mind that the can will be used as a container for food.

When empty cans are shipped to the packer they are usually handled in one of two ways. When shipped in bulk they are forked into the runways directly from the car. When shipped in bags or cases they may be unloaded by hand and fed into the can lines.

Can handling equipment should be properly designed to prevent scratching or marring of the can surfaces since points at which the surface coating is abraded are potential areas for rusting when conditions are unfavorable.

Filling and closing—Cans are washed with hot water before being filled. The interior of the can must be as clean as a food utensil. This is generally accomplished with high velocity sprays just before the filling operation.

Errors in filling should be avoided. It is good practice to allow a reasonable headspace. Some headspace is necessary and the air from this headspace should be exhausted so that a good vacuum is established in the can. The method of removing the air from the headspace will vary with each product. Too great a headspace generally permits the trapping of so much air that internal corrosion of the container is accelerated. When an exhaust box is used, it is important to maintain the temperature in the

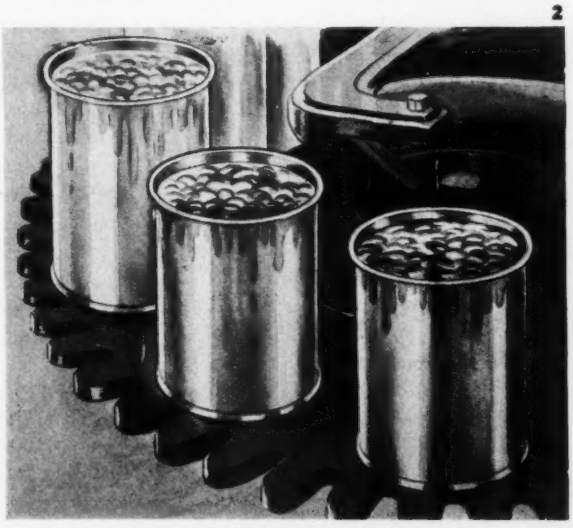
1—Cans cased and stored at temperatures exceeding 95° F. will retain excess moisture with adverse effects on the service life of the containers.

1



2—Spillage should not be allowed to remain on new wartime cans. Salt brine or sugar residues invite corrosion. Drawings, American Can Co.

2



box above 205° F. since below this temperature the conditions are favorable to rusting.

Faulty closures lead to warehouse troubles. Not only is the can with the faulty closure lost, but often the surrounding cans may also be damaged.

In certain instances, notably with citrus products, the juices from one container may cause perforation in the neighboring one setting up a continuous process so that great loss can occur if this is not checked.

Cans should be coded to show not only the product but also that date and preferably the time of packing. The oftener the code is changed, the easier it becomes to isolate lots when necessary. When an embossed code is used, care should be taken since sharp or misaligned type may cause fractures of the tin or enamel coatings leading to interior or external corrosion. In general, ink marking devices are preferred and with this type of code marking, phenol (carbolic acid) inks should be avoided.

Cans should be washed after closing. This is particularly true when salt brine, acid, sugar, or grease is involved. Some residues remaining on the can would induce corrosion. The best washing procedure involves high pressure jets playing on the cans as they leave the closing machine. Hot water is preferred and is often necessary.

Processing and cooling—When boiling water processes are used, it is important that the water be actively boiling since water below the boiling point can contain enough oxygen to promote rusting.

Elimination of air from the retorts is important for the same reason, and proper venting during the come-up time and bleeding during the process is important not only from the angle of corrosion but also for the safety of the process. Air in the retorts can cause understerilization.

Rust promotes rust and sometimes rusty crates can cause discoloration. This is known as "steam burn."

The chemical composition of the water used in processing and cooling may be a factor in the production of rust. When waters have a high natural alkalinity they will attack tin surfaces during boiling water processing or pressure processing carried on under water. The tendency of these waters toward detinning will etch or "spangle" the container and results in a condition which may lead to rust during storage. Should the waters contain quantities of chlorides and sulphates, the iron base may be attacked and rusting take place during exposure to water.

Similarly, corrosion may be induced with alkaline waters, with high chloride and sulphate waters, and slightly acid waters which are used for cooling purposes. Aside from the chemical content of the waters, the time of the cool and the temperature of the waters may be influential. As the temperature rises, an attack from such corrosive waters is accentuated. If the waters are warm then it is obvious that cans must be left longer in the waters to cool them and this gives additional time for unfriendly substances to work on the container.

Harmful salts dissolved in the water are deposited on the can as the container dries with a consequent prospect of corrosive action when enough moisture is again present to allow a reaction. These salts are apt to accumulate moisture from the air when the humidity is high. It is, therefore, possible for corrosion to take place during storage. With waters of this type it is highly important to drain the water from the cans as completely as possible. It is also desirable, when a limited supply of non-corrosive water is available, to use this non-corrosive water for a final dipping or spraying operation to wash off corrosive residue deposited in previous processing. Steaming the cans immediately after cooling with carefully arranged steam jets is also an effective way to remove much of this corrosive material.

Problems which derive from the use of alkaline or corrosive waters usually demand special treatments to correct each particular water supply. Thus, if there is any indication that the water supply may be responsible for rusting, a laboratory analysis should be made.

Cans should be cooled rapidly after processing, leaving just enough heat in the containers to dry them and prevent rust. Cans should never be cased when under 95° F. because the heat retained in the cans is insufficient to evaporate the residual moisture on the can surface and rusting may occur. On the other hand, if the average temperature after water cooling is greater than 100° F., there is danger of flat sour spoilage or early hydrogen springer formation, depending upon the nature of the product. In addition to providing for evaporation of residual water by allowing some heat to remain in the cans, water remaining on the cans after cooling should also be removed mechanically as far as possible. This may be done by tipping the retort crate after it comes from the cooling tank and allowing it to drain for a short time or by removing the cans from the crate and stacking them on their sides. A combination of draining and stacking provides the best protection against external rust.

Storage—Cool storage will markedly lengthen the shelf life of the container and maintain the quality of the product. Uniform temperature and low humidity is important as a means of preventing sweating.

Filled cans should be handled carefully lest they become dented and though still containing wholesome food suffer in appearance and be unattractive to the consumer.

Can handling equipment should be inspected to eliminate all points at which scratching, denting or abrasion can occur.

Wood cases made from green lumber cause what is known as "shook rust." Lumber should not contain more than 15—17 per cent moisture or a situation leading to "shook rust" will be encouraged. Fibreboard cases may also cause rusting if the board is damp.

Salt water spray or salt water is particularly corrosive and this point is an important one to remember when warehouses are located near a seacoast. Salt water must be removed from the cans and in some cases it is necessary to treat the cooling water chemically.

Label plates, due to their hygroscopic nature, have been known to give trouble. The packer should make sure that the paste or glue used for his labeling is suitable.

The warehouse storage temperature is a very important factor in determining the quality of the product. This is true regardless of the product and the size of container. The canner must keep his product cool and dry.

Can decorating

by William N. Misuraca

With the return of peace, the doughboy will shed his olive drab with scarcely more enthusiasm than the metal decorating industry will display in changing over to the civilian way of life. Color—and lots of it—will be the order of the day, and eye appeal will once more influence the buying public's choice.

Just how many products packed in metal containers in prewar days will reappear on the market in the old familiar label and how many will be dressed up in a different manner, is problematical. However, it is to be expected that a certain percentage of manufacturers will take advantage of the present lull in the production of fancy metal packages to redesign the old label, to make its appearance more appealing and attractive to increase its sales possibilities. This is in line with a logical modernizing program, but the question is often asked: "What has the metal decorating industry to offer that's new and in keeping with all the latest developments that we are given to understand are in the offing?

Unfortunately, the buying public at large has gained the impression that many, many new developments are available, their release on the market awaiting only the day when hostilities cease. Of course, we of the metal-decorating industry have not been idle during the period of emergency.

Sandwiched in between our war efforts, and in anticipation of the day when all restriction will be eliminated and full sway can be given to the accumulated knowledge, we have tried to assimilate whatever new developments are adaptable to our product. Nevertheless, it has to be realized that much with potential application to metal decorating must await changes in the existing equipment, changes which at this writing are not possible, before it can be fully developed. Application of new developments must be postponed until a more opportune time after we have won the peace.

Since the method of metal decorating is essentially a lithographic process, we must also look forward to developments in that industry which are applicable to ours, and so we learn of a plastic lithographic plate, of a press that utilizes electronics for the transfer of ink from the litho plate to the metal sheet, of new methods of color separation in the reproduction of designs for labels, and of various other developments. *(Continued on next page)*

1—*A range of effects may be achieved by applying decoration directly to metal. This technique will return after the war. Photo, National Can Corp.*



While the foregoing is very interesting and gives much food for thought, there remain two principal points that require our immediate attention: firstly, speed of production; secondly, the quality of the finished product. Speed of production, of course, must of necessity depend upon special equipment which at the moment cannot be relied upon. That does not, however, apply to the quality of the finished product, for most informative knowledge on that score is available at present—the only restrictions being those which the emergency requires.

Obviously, it is possible to discuss only that information which is at the disposal of the metal decorator today, and it must be realized that, due to war limitations, even such information is meager and can only be tentative.

Much has been said and intimated regarding the part plastics will play in supplanting metal packages for some products, and we hear of aluminum as the ultimate in metal containers, and magnesium, and paper, and chemically treated blackplate, and so on. But little or nothing is said about the fact that metal containers still remain a most logical packaging medium, and when lithography is used directly on the metal, they have a finish that leaves little to be desired.

Synthetic resins, in the form of coatings, either transparent or colored, have for a long time been utilized in the technique of metal decorating. In fact, it is due to these resinous coatings that such packaging milestones as beer in cans have been made possible.

How much more extensively these types of finishes will be used in the future cannot be hazarded, but it is not difficult to understand that the knowledge we possessed in regard to synthetic resins has increased ten-fold since the beginning of the war, that manufacturing facilities for producing such resins have been multiplied and that an outlet should be found for such products.

We like to visualize a metal decorated package having a metal inner core, the inside covered with a synthetic material resembling plastic—practically odorless, tasteless, and resistant to most products—the outside also covered with some synthetic material easy to lithograph in a variety of colors and possessing a glass-like finish, both washable and chip-proof. While such a metal package is not easy to make, at the same time it is not impossible to produce, and would solve many a packaging problem.

Those of us who have looked upon any metal package as "just another tin can" have learned through this war era that the "lowly tin can" has been so highly developed in manufacturing—both in the speed of production and in the efficiency in the package itself—that nothing has entirely supplanted it as yet. Its standing as a simple and efficient container remains unimpaired.

Let it be clearly understood that this statement is not made to the detriment of the efforts expended during this emergency to produce a substitute package comparable to a tin can or to a lithographed metal container, but rather to impress upon the reader the fact that much that has been conveyed to the buying public regarding the many novel packages which will be available immediately after the war—and which will revolutionize packaging—has been generality.

Of course we will see some novel packages—the packaging industry is always on the lookout for new developments—but they will come at the proper moment and only after there has been plenty of time for readjustments. In the meantime, we are looking forward to the day when color will again be the order of the day and lithography, as applied to metal decorating, will produce that high quality of work for which it has been deservedly famous for many years.

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2—Lithographing the can itself instead of employing paper labels is particularly advantageous for products such as those shown in this illustration. Oils, varnishes and lubricants do not deface the package surface, while powdered soaps do not lose their identity when handled by consumers. Photo, Continental Can Co.

Fibre-bodied cans and tubes

Metal conservation orders have caused the fibre can to be commandeered for a lot of jobs it never did before. At the same time, restrictive orders have also drastically limited the number of products which can use metal-end fibre cans.

For direct war work, the fibre-bodied can is finding a multitude of uses. One of the most interesting is for individual shells which are packed in spiral-wound fibre canisters which have metal ends and a telescope of type closure.

Lubricating oils in fibre cans are another war product. The nature of oil requires an interior protective coating. Lithographed or printed labels on the exterior make these new paper containers resemble the conventional metal lubricating oil can.

Perhaps because paint is so widely known and commonly used by the consuming public, its new packages have attracted considerable attention. Some of these are easily recognized as new, but many are scarcely distinguishable from the old familiar metal container in appearance and function.

One of the most striking paint packages to be developed is being used by one of the major paint companies. It consists of a can made of spirally wound kraft strips, with an inner lamination of metal foil. The package was developed by the company's own engineers who also set up the can manufacturing equipment which they were able to assemble from second-hand machines and homemade conveyors.

Selection of fibre

Because of the extensive variety of products to be packed, there can be no one standard body construction of fibre cans. Each specific product must be thoroughly analyzed and so must the fibre materials in which it is to be housed.

All those products which are hygroscopic or which will deteriorate if exposed to humidity, are put into containers of moistureproof material.

Types of fibre containers

The fibre cans expressly used for dry products may be divided into nine distinct types, all of which are made in a wide variety of sizes and shapes. The physical construction of each type will vary somewhat, depending upon production considerations and equipment of the manufacturers. The following constitute the most popular container types:

Paper cap cans—The fibre can with a paper cap is ordinarily limited, because of technical considerations, to cylindrical shapes, although a few oval cans have been

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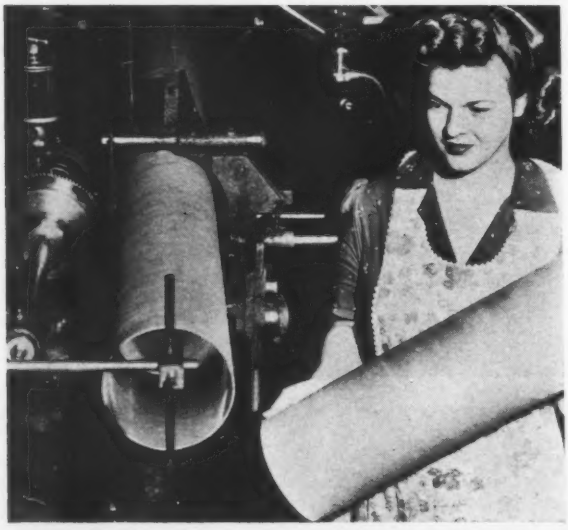
1—Fibre-bodied cans are a composite of the several component parts shown here. Bodies may be oval, round or square, with metal ends. Tops may be varied — illustration shows three friction tops and one sifter top. 2—In manufacture, fibre cans usually are made in long lengths, labeled, then cut to size, after which metal ends are crimped on the bodies. View shows finished cans as they emerge crimped. Photos, Continental Can Co.

3—Fibre-bodied paint can is made of spirally-wound kraft and metal foil. 4—Can body is formed as a long tube, cut off in lengths for convenient handling, later cut to required size for containers. Photos, Sherwin-Williams Co. 5—Standard types of fibre-bodied cans, showing variety of sizes and shapes, with various tops. Photo, American Can Co.

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introduced into the market. This type of can is constructed with fibreboard ends, or so-called paper caps. These ends are either removable or sealed on, depending upon the requirements of the user. The top end may be fitted with a pouring or sprinkling device for convenient dispensing of the contents.

The caps are furnished in a range of colors and, within limitations, may also be embossed or printed. Labels may be applied directly to the body of the can by the maker; or the user, after filling the container, may affix the label over the flange of the cap and thus seal the package.

Friction-plug-top cans—The friction-plug-top fibre cans with metal ends seamed onto the body are manufactured with round, oblong, oval or square bases. The plug is clamped securely in place by friction and can be pried loose without damage to the container.

Metal-slip-cover cans—The metal-slip-cover fibre can, which is made preferably on a small oval or round base, is an economical container for products requiring a full opening. If labels are to be applied over the flange after filling, the cover should have a raw edge; otherwise a curled flange is desirable.

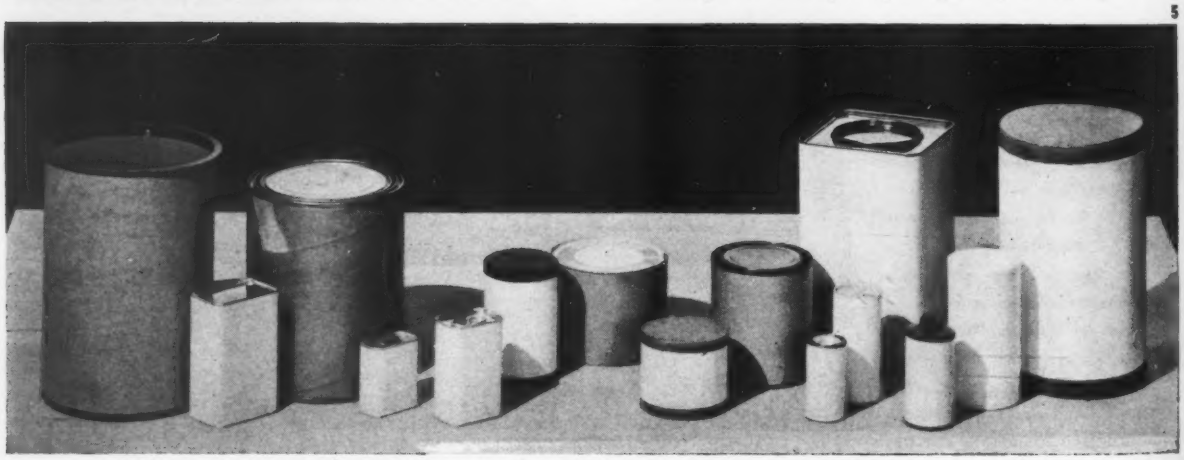
Interrupted-thread-cover cans—This so-called interrupted-thread device allows the cover to be easily removed by a slight twist of the hand, and yet when assembled, the container is securely locked. The full opening in the top allows easy access to the contents of the can. A drumhead seal may be affixed to the top.

Closed-top cans—This type of can makes a tamper-proof non-refillable package in that both the top and bottom are made of metal seamed onto the body. The top may, or may not, be fitted with revolving or push-slide dredges, pouring spouts, or semi-perforated knockout holes. These containers make excellent packages for scouring powder, spices, birdseed, insecticide, etc.

Planetary-top cans—This can calls for a two-piece top, an under-cap crimped onto the body and a revolving over-cap, usually of some finished metal to provide a high-lustre end of striking appearance. The tops have a variety of sifter-hole arrangements, often carried out in some design motif.

Raised-neck-top cans—The top of this can consists of a raised neck assembled to the body of the can, perforated with single or multiple openings, depending upon the

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nature of the contents. This type of container is generally used for talcum or tooth powder.

Telescope cans—Three interlocking sections are required in the manufacture of telescope cans: an inner tube and an upper and a lower outer tube. These fibre segments are fitted together so that the outer tubes act as closures for the inner tube. This package is used as a tamperproof mailing case.

Screw-top cans—There are two styles of screw-top cans: on one the fibre body is threaded outside at the top; on the other type, a threaded neck protrudes from a crimped-on body to which the cover is assembled.

Spirally-wound fibre cans

The adaptability of the spirally-wound fibre can is manifold since its construction allows the use of many different fibres and adhesives, thus serving the desired requirements of any number of products. In the manufacturing process, ribbons of fibre are wound around a steel mandrel, the diameter of which is the same as the inside diameter of the can to be produced. As these ribbons are wound on the mandrel at an angle, one over the other, and so placed that the top one overlaps the joint on the under ply, it is possible to produce a tube of any desired length and construction.

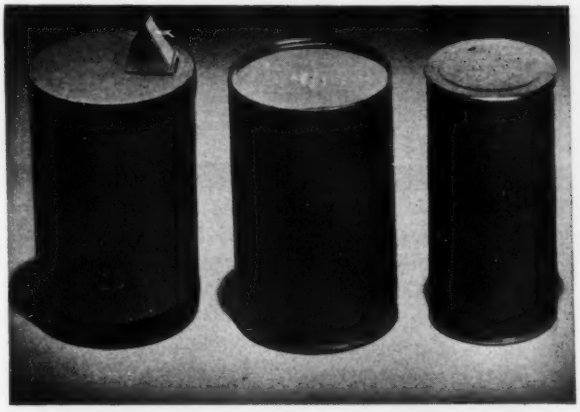
Since the original tube from which the bodies are made is composed of several individual ribbons, almost any combination of materials—glassine, manila, kraft, straw chip, etc.—can be used, and a ply of any of these materials can be introduced at almost any place in the body, to meet the requirements for which the can is intended. For instance, a body can be produced with one ply of parchment paper, another of almost any thickness of fibre, and a third, of some different material, while the fourth ply may be a ribbon of colored paper, which, wound on the outside of the tube, would make a colored can. Since the adhesive is applied to each individual ribbon, almost any adhesive can be used for any particular ply of ribbon. Spirally-wound cans can be made only with round bodies, because the ribbons of fibre must slip around the mandrel, but this characteristic has its merits, because it permits continuous production, at a high rate of speed, with a resultant low cost of manufacturing. After the bodies are wound into tubes (in some, multiple of the length of the can being made), strip labels, i.e., multiples of single labels, are applied by hand and the cans are then cut to the proper or desired length.

Convolutely-wound cans

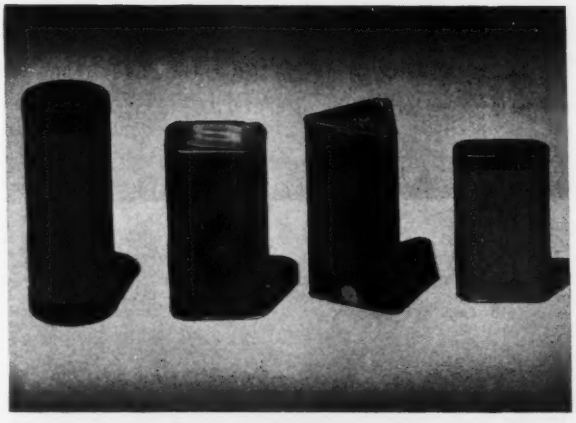
In the manufacture of the convolutely-wound fibre can, the ribbon is wound flush on a mandrel which revolves some required number of times and thus provides the necessary number of plies of fibre ribbon to complete the body. The ribbon is then automatically cut and the body moved along the mandrel to the position where the label is applied. During this second operation, the body of the next can is being rolled. The completed body is then ejected from the mandrel, ready to receive its caps or ends which can be fibre or metal in a round body, but metal only in irregular shapes.

6 & 7—Normally, fibre cans are made round, square, oblong, 'obround' or oval and may have sifter tops or pouring spouts. Bodies may be made moisture resistant or greaseproof. Photos, Sefton Fibre Can Co. 8—All-fibre can made on a modified standard can-making machine by same process used to produce the familiar tin can. Photo, American Can Co.

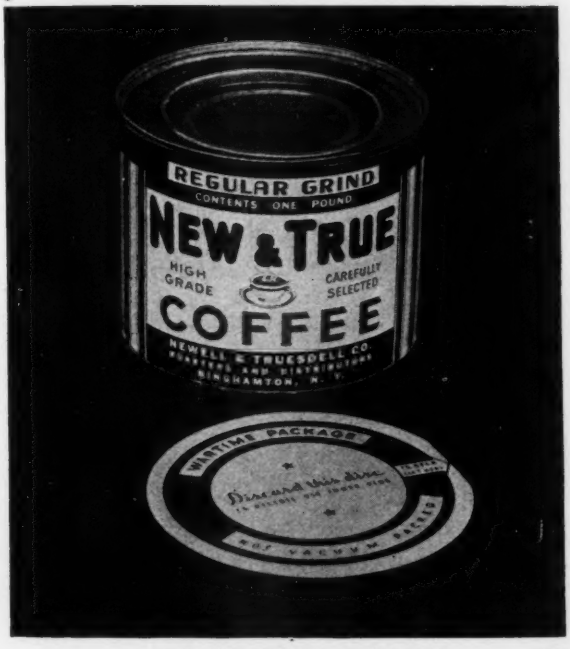
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Paper cups and cans

This classification, so far as this article is concerned, includes such packages as nested containers as well as packages designated by the term liquid-tight containers. These packages have extended their usefulness far beyond the purposes for which they were originally developed. The first uses were for dairy products, such as cottage cheese and ice cream, and those products are still the big volume users. There is also an increasing demand created for these containers by such products as cream, sea foods, delicatessen items, lard and meat products (the last two items usually calling for larger sizes of containers).

Critical shortages of all packaging materials forced producers of items such as lard, shortening, tobacco, etc. to resort to paper cups and canisters for packaging their products. In view of the many new coatings and linings which have been developed, permanent gains for packaging of this nature can be expected.

Cylindrical and slant-walled canisters are among the oldest types of liquid-holding paper containers. They are usually formed of a fine grade of bleached sulphite and are wax coated or otherwise treated to prevent absorption and penetration by liquids. On the slant-walled type, the wax coating serves to stiffen the board to a substantial degree and this permits the effecting of a relatively tight seal by the use of die-cut paperboard closures which fit as friction plugs into the tops of the containers.

On cylindrical types, partially telescoping, overlapping lids are used, permitting the container to be filled to the top, and completely protecting the inside of the container both before and after filling. One type utilizes slots, located slantwise in the side walls of the lid to provide air vents, which facilitate removal of the canister covers; another type has a multiple beading around the top of the container for easy application and removal purposes.

1—Dairy products were the first to employ liquid-tight paper containers, continue to be large users. Photo, Cupples-Hess Corp. 2—Improved coatings and linings make it possible to package meats, baked beans, vegetables, chemicals in fibre cans. Photo, Continental Can Co.

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Pre-fabricated "bottles"

Developed originally for milk and cream and still largely restricted to this purpose are a number of types of so-called paper "bottles" pre-fabricated in boxmaking plants and shipped under sanitary conditions to the dairy where they are filled and resealed either on standard bottle-filling equipment or—in the case of some types—on special machinery. These containers vary widely in their structure, some assuming the form of truncated columns with metal inserts at the neck opening to provide rigidity and to permit the use of plug-type paper closures. Others are rectangular in shape with tops and bottoms seamed to a formed side wall blank and with staple-attached closures.

Bottle "blanks"

Other types of paper milk "bottles" are supplied to the dairy as flat blanks and are erected and sterilized immediately prior to filling. Here again, shapes vary from the cylinder with pleated top through the cone with flat metal closure to the rectangular type with slanting top and side and an integral closure opening.

Liquid-holding bags

The development of water-holding sheets, such as rubber hydrochloride, has permitted manufacturers of products of a liquid or semi-liquid nature and of products sold in brine to use watertight bags as their containers. Such containers, in the smaller sizes, are sometimes used in the form of a bag alone with heat-sealed closure. Larger sizes, requiring a rigid form for merchandising appearance, shipability or structural strength, are usually placed in folding cartons. In some instances, the transparent watertight sheet material is laminated for reinforcement and greater strength.

Sanitation requirements

Paperboard containers for food products are usually manufactured of board specially prepared in a way to ensure against contamination. The coating process, involving immersion or spraying with hot wax or similar materials, acts as a further insurance in sanitation. Great



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care is exercised by manufacturers to protect the containers against contamination during shipment.

Decoration

Paperboard liquid-holding containers may be decorated in a colorful manner. Printing usually precedes the impregnating or coating operation. Wax coatings, of course, have an effect on the printing which must be allowed for in planning the design. The general effect is to soften tones and lighten them to a degree.

Paper-container economies

There has been controversy, particularly in the milk field, over the relative economic desirability of glass containers as contrasted with paper containers. No clear-cut statement can be made since the relationship of costs varies with every dairy operation. In general, it may be said that the original cost of the paper bottle is less than that of the corresponding size of glass container. The cost per trip is a more debatable point, involving such factors as relative shipping costs, in view of weight differentials, bottle breakage. glass container cleaning costs, multiple trips of glass bottles as contrasted with single trips of paper containers, etc.

3—Common sizes include the quart, pint, 12-oz. and 8-oz. Photo, The Sealright Co., Inc. 4—Containers with snap covers for hot foods and liquids. Photo, Lily-Tulip Cup Corp. 5—Cone-shaped prefabricated bottles with metal-ring closure seals and paper closures. Photo, Sutherland Paper Co. 6—Lard now goes to market in bulk containers of fibre. Photo, Sutherland Paper Co. 7—Slanting side walls permit nesting containers for convenience in handling and in storage. Photo, Dixie Cup Co.

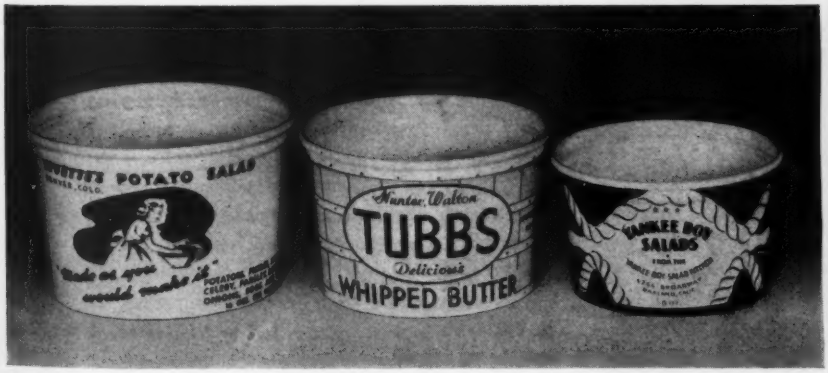


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Collapsible metal tubes

by A. W. Paull, Jr.

Today, one of the most disturbing questions in the packaging field is "Where am I going to get some tubes?" In view of the recent tightening up of the control orders, the answer seems to be "Where?"

As a result of the shortages, manufacturers in some instances have found it necessary to adjust their formulas to meet the new conditions imposed by the new types of tubes. Wax and lacquer liners in tin-coated lead and lead tubes have generally been successful. In very few cases has difficulty been experienced to the point of removing the product from the market. Nitrocellulose cements in lead tubes have been troublesome, but in most cases the problem has been solved by the addition of an inhibitor.

Aluminum tubes are currently being manufactured, but in disappointing quantities because of extra manpower and equipment required. No plastic or paper tubes have as yet appeared which have been commercially successful, since none seems to be moistureproof.

Phenolic materials for plastic caps have generally been available until very recently, but it is expected that the supply situation on all molding materials will continue to be rather tight for the duration.

The chief problem before the industry today is the shortage of collapsible tubes available for civilian use. Very heavy requirements by the Army, Navy, Chemical Warfare Service and Quartermaster are expected to take approximately 75 per cent of the tube output throughout 1945. Industry production, however, is about double the normal peacetime production so that you can figure from this that civilian uses will get about half of normal. From this you can readily understand the concern of tube buyers who are now planning their future schedules. It looks as though civilians will get a short deal, and although the government services have promised little relief until after V-E Day, we are hopeful that sizable cut-backs will ease the situation.

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Metal collapsible tubes have gone to war in a big way because they are light in weight, sanitary, fold up out of the way as used, bend around other articles when jammed into a knapsack and will not shatter or cut the soldier or sailor who now carries a dozen different tubes wherever he goes. These consist of the usual shaving and dental creams, burn ointments, medicinals, morphine, sulpha drugs, prophylactic, camouflage paste and others of a confidential military nature. Civilian uses for tubes remain about the same.

The tube industry has for years had a substitute for tin tubes, used to some extent in this country and to a much greater extent in Europe, in the tin-coated lead tube, known also as "tin-plated," "tin-lined," "laminated" and "composite" to avoid calling attention to the fact that lead is the basic metal. More recently, tubes made of a tin-lead alloy have been used and these two substitutes, each of which provides a saving of about 70 per cent of the metal used in all-tin tubes, are the only metallic substitutes developed commercially which have proved to be satisfactory.

Many tubes using plastics, paper, or other basic materials have been invented, in the hope of finding one that can compete with the demonstrated qualities and economic advantages of metal tubes.

The approach to the use of substitute materials for tubes should be by way of exhaustive tests with the actual products to be packaged, particularly when essential oils are included in the formula. The responsibility for such tests should rest with the manufacturer of the product. His own self-interest should dictate the selection of the metal and lining material for his product.

The metal-substitute tubes are made according to the standards of the Collapsible Tube Manufacturers Asociation for standard tin tubes which have been in effect for many years. Decoration (labeling) is the same as heretofore, although shortages of the imported oils used in coating materials may affect their quality. To some extent, the use of metal caps may be dictated by necessity but, in all essentials, substitute tubes will retain the advantages of this type of container.

1—Wax or thermoplastic coatings may protect contents of collapsible tubes of tin or of substitute materials. Photo, Wheeling Stamping Co.



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2—*Small tubes for medicinals. Photo, New England Collapsible Tube Co.*
3—*Collapsible tubes may be had in varied sizes and designs. These tubes are not yet filled and sealed. Photo, Victor Metal Products Corp.*

Under normal conditions, collapsible tubes may be classified in five types, depending on the material.

1. *Pure tin tubes*—Made of new virgin tin, alloyed with a small amount of copper or other suitable stiffener, in minute quantities. No adulterant, such as lead or other soft metals, is used in these tubes and they are essentially for use for any product going on or in the human body. Included among these products were toothpastes, shaving creams, cosmetic creams, depilatories, contraceptives, ointments food, hand soaps, and pharmaceuticals.

2. *Lead tubes (lead-alloy tubes)*—Made of lead alloyed with antimony or tin. They have been used almost entirely for non-personal products such as adhesives, shoe polish, paints, colors, and grease.

3. *Aluminum tubes*—Made of pure aluminum, formerly replaced tin tubes to the extent of about 10 per cent of the total consumption. Because of the great chemical activity of aluminum, use of it was restricted to chemically neutral products until suitable vinyl compounds were developed for use as internal coatings.

4. *Tin-coated lead tubes*—Lead-tube structures coated with thin layers of tin, inside or outside or both, which present much the same appearance as tin and are less expensive. However, they have not been generally accepted as fulfilling the standards of quality set by manufacturers or by the public. In some cases, the combination of the two metals in the presence of an electrolyte—an alkaline product, for example—has resulted in electrolytic action detrimental to both product and container. Internal coatings have been perfected which have largely overcome this objection and, for the period of the emergency, tin-coated tubes have been approved for shaving creams. This approval may be extended to other products.

5. *Tin-lead alloy tubes*—A recent development for which some advantages over tin-coated lead are claimed. The principal difference is the avoidance of electrolysis. Tubes of this type may be internally coated, as in the case of aluminum, and tin-coated, with equally good results. They are somewhat more costly than lead tubes.

There is no great trick in drawing tube specifications. The dimensions are determined by the amount of product it is desired to pack or by the size of tubes used in similar price lines by established competing products. The size of the neck opening is, in large measure, determined by the plasticity of the product and the quantity ordinarily used in one application. Thus, "brushless" shaving creams are packed in tubes with large openings, ophthalmic ointments in tubes with pinholes tips.

Specifications for tubes require the following data:

DIMENSIONS:	Diameter at the shoulder; length from shoulder to open end
	Size of neck or diameter of neck opening
	Wall thickness at shoulder
CAP:	Material and type of cap; type of liner
DECORATION:	Shoulder embossing, if any; coating and number of colors in printed matter
METAL:	Tin, tin-coated lead, lead or aluminum

The cylindrical shape of collapsible tubes is dictated by the method of manufacture and the method of closing and sealing. Possibilities of variation in structural design are, therefore, nil. Design enters into the appearance of the cap and the embossed decoration on the shoulder, but it is on the "label" or side that design has fullest opportunity. While the fixed cylindrical shape imposes certain limits, these are the only limitations. Label designs may be of any character capable of reproduction by zinc etching, photogravure, or half tone. Decoration may be printed or embossed and printed in from one to four colors on a white or tinted coating. By the use of process plates, additional tints can be secured.

Coatings for collapsible tubes

by Robert J. Gray

Choice of coating material for the collapsible tube is a factor of great concern to manufacturers whose products are packaged in these containers. The versatile tube has such a range of uses that today, in the terms of the chemist, it must withstand products with a range of 3.5 to 11 pH, This means, in non-technical terms, resistance all the way from a good sour, acid vinegar right through to a harsh washing powder.

With such a wide range of acidity and alkalinity for products packaged in tubes, there is a tendency on the part of some to perforate or pit the metal of which the tubes are made, causing a growing demand for protective coatings. This demand existed even before the war, when there was no scarcity of metals from which to make tubes. With the wartime scarcity of tin, however, lead has become the common tube-making material, and protective coatings have assumed an even more important role, not only to prevent pitting, but also to prevent contamination by lead salts.

During the past two years researchers have been investigating this question of lead pick-up. Dr. David Menard's findings[1] indicate a significantly lower absorption of lead from wax-coated tubes. During the same period, the members of the Packaging Institute have carried out a great deal of as yet unpublished work which has led to the same conclusions. There is still much work to be done, because of the many factors which appear to affect the situation. For example, there are indications that underfill in tubes seems to influence lead pick-up considerably, with underfill tubes showing a 300—600 per cent increase in pick-up over the filled tubes.

Types of protective coating materials

There are two main types of coating materials—thermoplastic coatings and lacquers. Each has its field, although the thermoplastic coating appears to offer greater resistance to contamination over a much broader range of products. Lacquers, in general, are hard to apply and to dry. They require special equipment for application, as well as the evaporation of the solvents used. They have a tendency toward pinholes, due to their variable nature, and their anchorage to the tube body is not too satisfactory. In general, also, lacquers have poorer resistance at the higher pH values.

Wax-type thermoplastics are more widely used than lacquers, and they are far easier to apply. Good equipment—such as the Peerless and Hiller tube-coating machines—in general use among the trade, is available at present. The performance of wax-type coatings naturally depends upon the material used, since a marked difference exists between the films formed by ordinary waxes, by blends of waxes and by the new thermoplastic coatings. This difference must be remembered when considering wax-type coatings.

Ordinarily, simple waxes or blends of waxes may fail to give complete protection of the tube, for reasons of lack of continuity of the film, tendency toward development of pinholes and possible crystal formation. From an operating point of view, the viscosity of waxes or blends of wax is ordinarily so low at the application temperature that it is difficult to produce a film of sufficient thickness to give the best protection. In addition, adhesion of many of these films to the tube wall is low.

Thermoplastic coating materials, on the other hand, are characterized by cohesiveness and continuity of film. They are solutions of selected blends of waxes with high-polymeric, non-waxy materials of complex molecular structure which inhibit crystal growth and favor continuity and impermeability of the film. These thermoplastic coatings produce good adhesion to the metal tube and are flexible. They are also characterized by a hard surface which resists the abrasion of the filling operation. From an operating point of view, they are homogeneous products which do not separate or throw out in the melt tank, and their controlled viscosity over a wide temperature range gives coatings of uniform thickness.

Application of coatings

Thermoplastic coatings are applied by flushing the inside of the tube as a final operation of manufacture. The tubes, either singly or in pairs, are placed over a vertical mandrel having an actuating pin in the top. After being flushed by pressing the tubes down on the pins, a conveyor belt then carries them through a heated oven of about 200° F. (or a temperature sufficiently above the melting point of the coating material so that the excess drains off), leaving a thin, uniform film. The drainage time is approximately 45 seconds. The wax tubes are then inverted and packed into containers.

Thickness of coating

Opinion as to thickness of coating desirable varies quite widely. It is certainly true that the thicker the coating, the less the diffusion of lead, all other things being equal. There are other factors to be considered, however —the tendency of heavier coats to crack and formation of a heavy lip of coating at the base of the tube which interferes with the sealing and crimping operation.

The future outlook

At the present moment, thermoplastic coatings are doing much to reduce the variability in performance of today's collapsible tubes. While the use of coating materials has assumed a major role during wartime because of the lack of metal available for tube-making, there will always be a wide market for coated tubes.

[1]Published in the "Journal of the American Pharmaceutical Association" (Scientific Edition, Vol. XXXII, No. 8, August, 1943).

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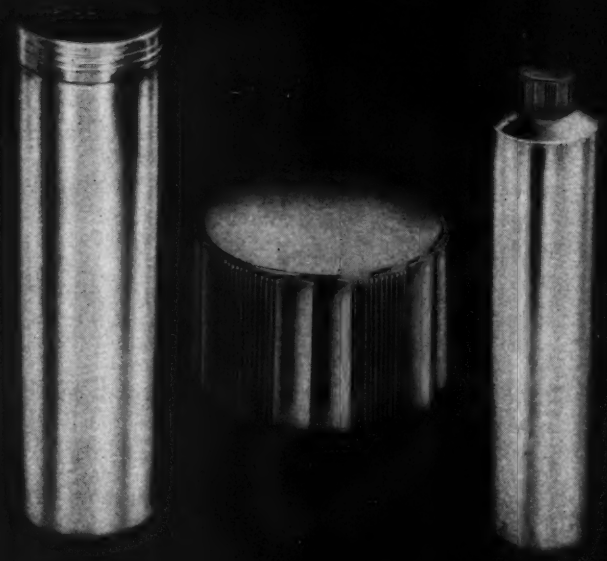
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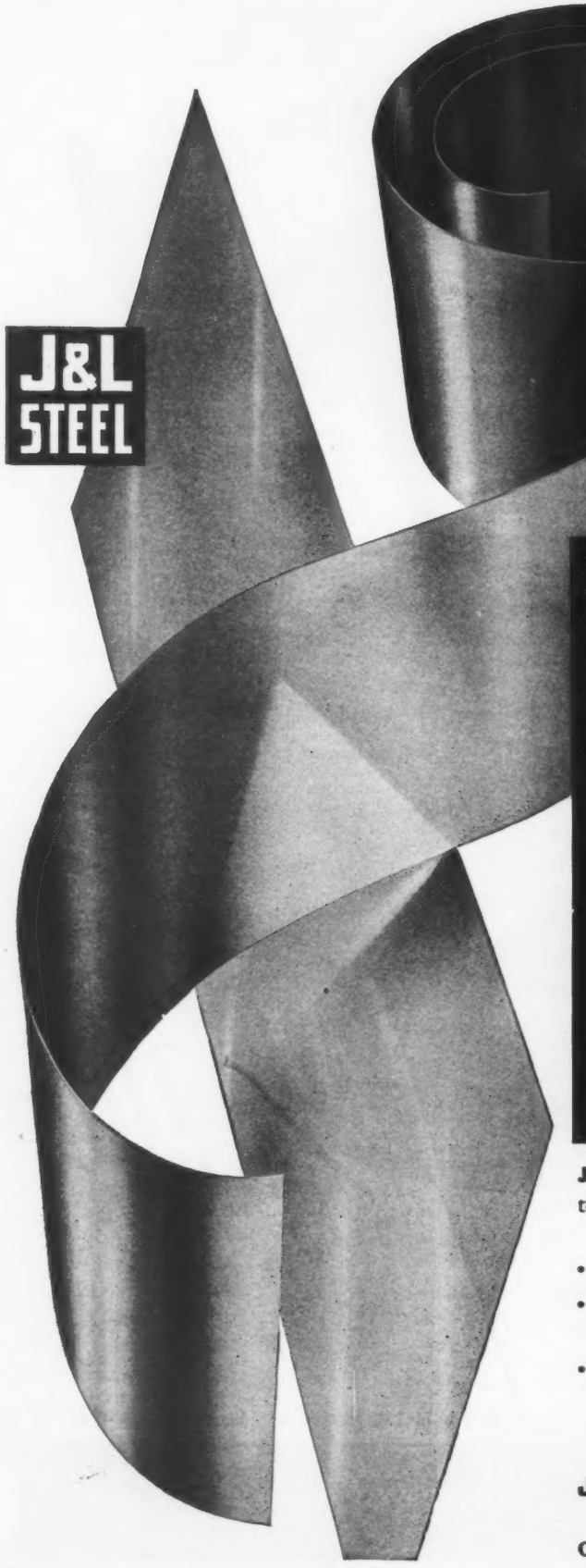
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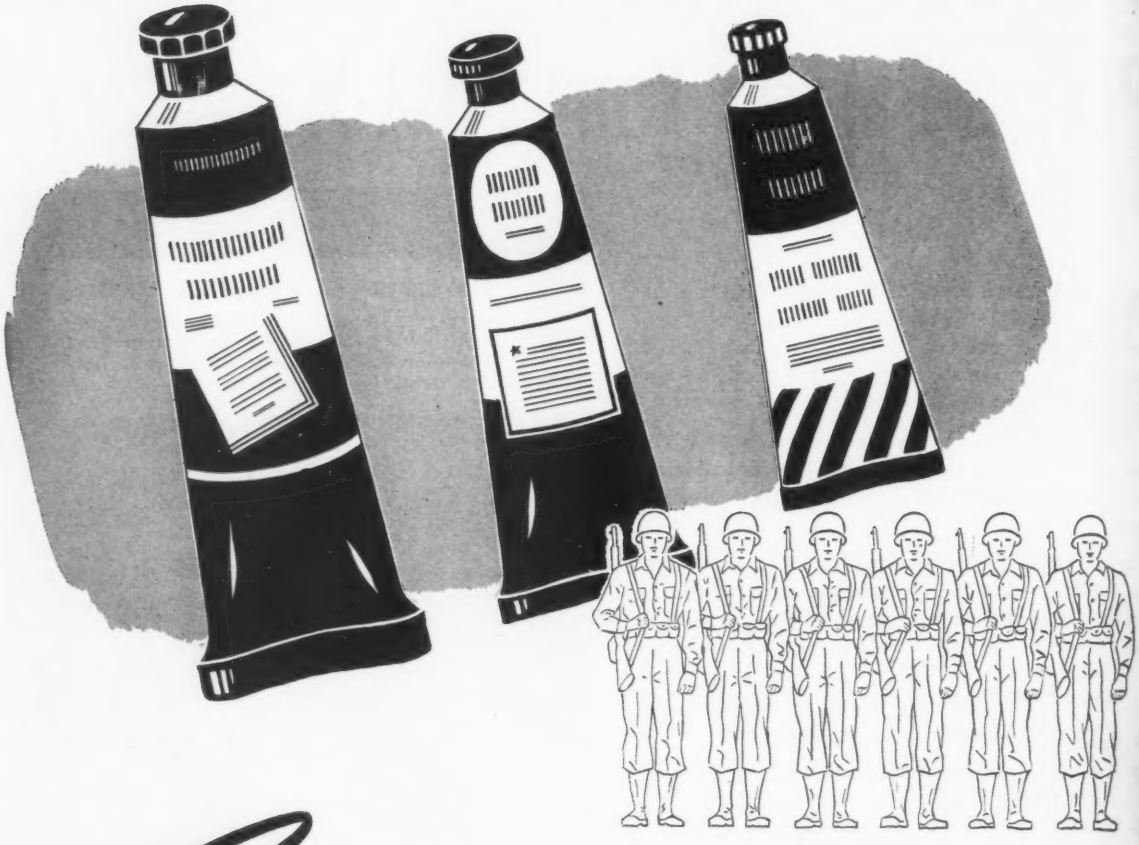
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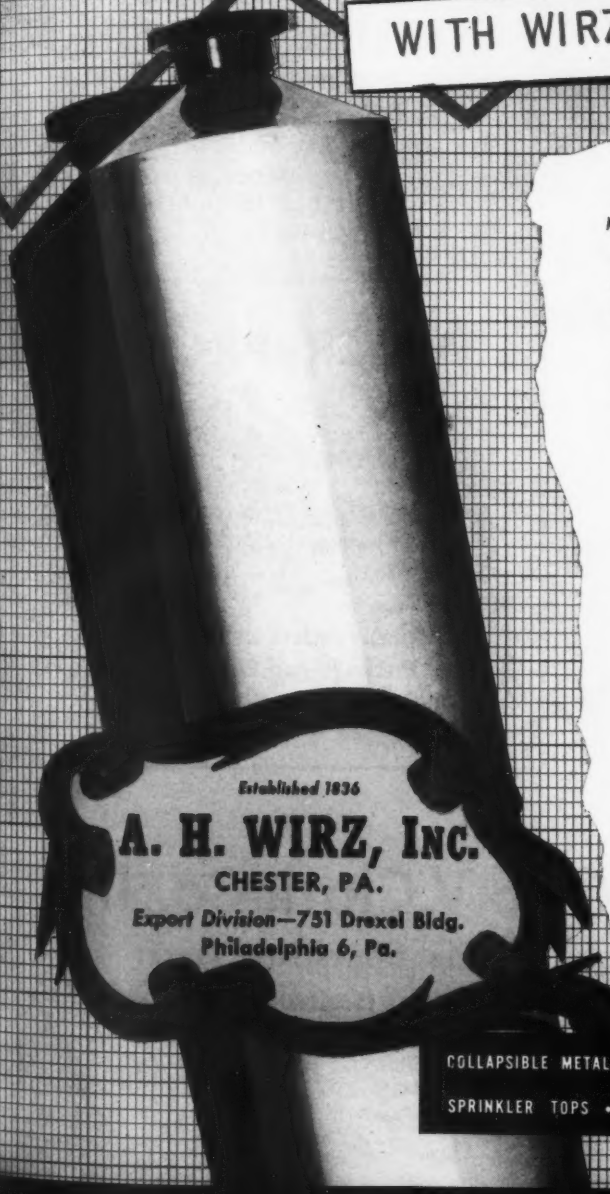
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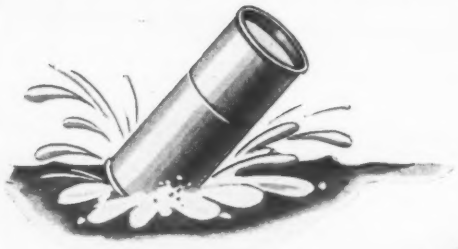
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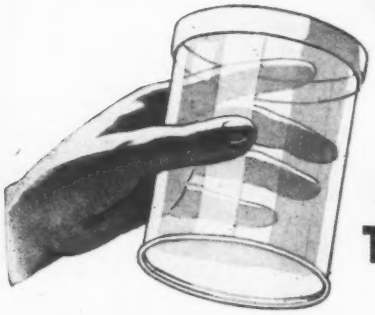
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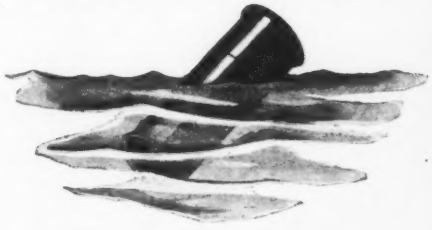
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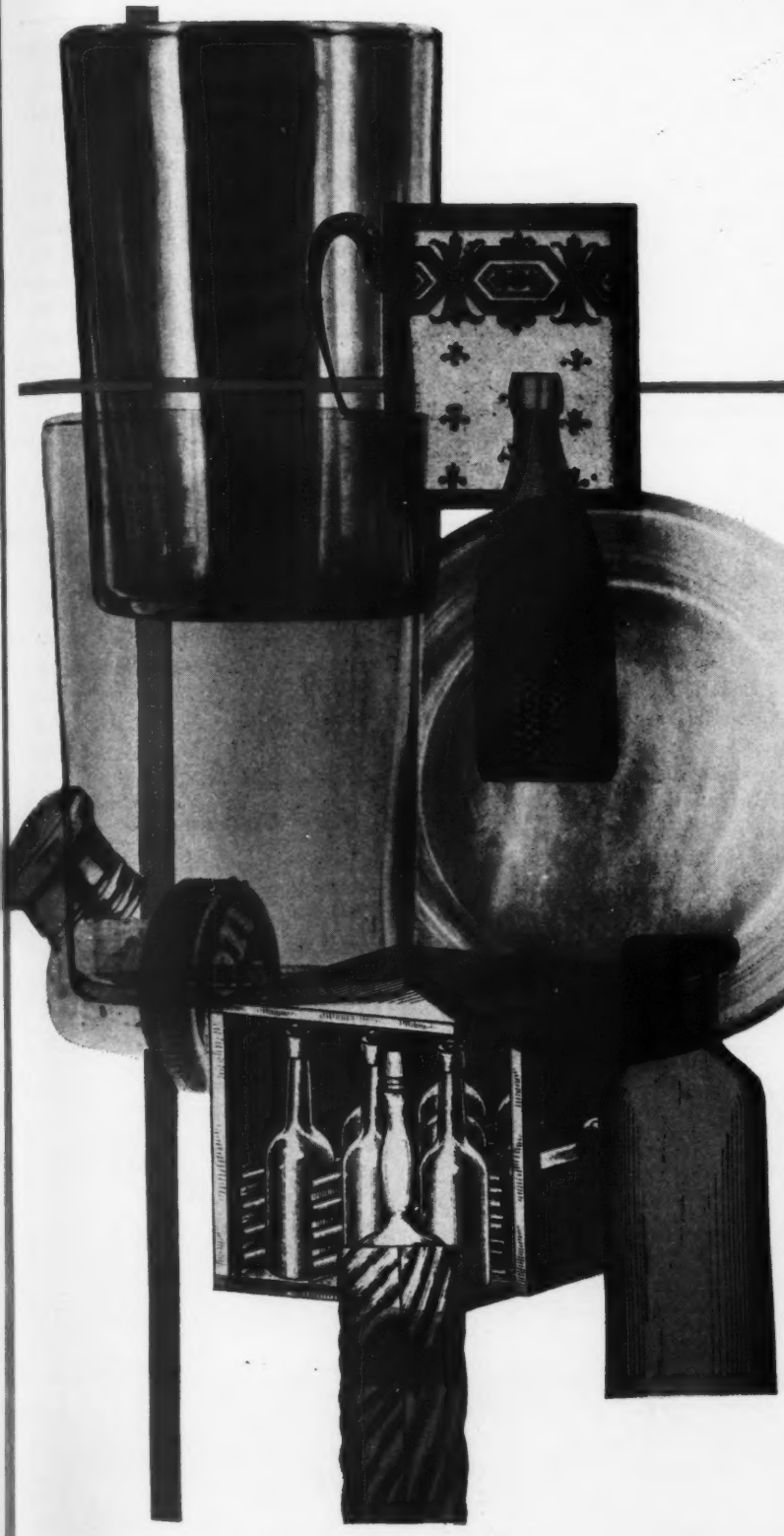
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GLASS POTTERY CLOSURES



The glass package today 516

Handling glass on the production line 519

Standardization of glass containers 522

Handmade glass bottles 525

Tumblers as packages 527

Specialized glass containers 528

Closures — finishes — liners — seals 531

Pictorial review of closures 536

Pottery containers 543

Merchandising the glass package 545

The glass package today

by E. C. Emanuel

When the war began, the shortages of many packaging materials sharply accentuated the trend toward a wider use of glass. There had already been a slow but steadily increasing growth in the use of glass containers. The pressure of military needs, however, is mainly responsible for the fact that production of glass packages rose from 52,116,000 gross in '40 to an estimated 104,000,000 in '44.

Products which for years had been packaged in other containers began to appear in glass, and the use of glass containers quickly rose to new high levels. This was to be expected, for although glass also is widely used in military channels, the raw materials for its manufacture are fairly abundant even in wartime, and glass lends itself well to efficient, large-scale production.

How much of this war-bestowed gain will glass hold after the war, when other materials are freely available again—and when the glass container must be sold purely on its merits instead of on the basis of merely being available? What technical improvements in the character of glass and glass containers, closures, liners, etc., have been made recently, and what possibilities of further improvements may be indicated in current research?

For the present, problems of production seem to have taken precedence over problems of merchandising. Many manufacturers are finding that they can sell just about all they can produce without much regard for how their product is packaged. But after the war it is safe to assume that this picture will be changed completely, and in the postwar battle for markets we can expect to see sales managers striving, perhaps as never before, to put sales appeal into their packages.

Glass has long been standard for many products

Glass has for many years been the standard container for beverages of all kinds, both still and carbonated, for pharmaceutical products and druggists' sundries, for some household products, and for a variety of staple food products such as milk and cheese and cheese spreads, edible oils and nut butters, salad dressings, olives and pickles, catsup and chili sauces, jams, jellies and preserves, and some fruit juices.

The extension of the use of glass because of the war has been most marked in two main fields—food products and industrial products.

It is altogether likely that most industrial products which now are packaged in glass as an alternative material will return to the containers in which they were packaged before the war.

In the food field, however—particularly for fruits, vegetables and vegetable products—glass can be expected not only to hold its gains, but to extend them, for many packers now are discovering for the first time that glass is the best container for such products. This is particularly true of foods that do not require hot-processing.

Demand for distinctive package favors glass

But we can expect an increased use of glass in the postwar period throughout the packaging field. Competent

1



1—Glass packages enable the consumer to see what she is buying. Here the sale of related items is promoted by packaging a complete line of household products in standardized glass containers which may be arranged in attractive and compact displays. Photo, Owens-Illinois Glass Co.

observers believe that the end of the war will launch a new era of merchandising. The nation's production facilities have been expanded tremendously by the demands of war, and when peace returns the necessity of utilizing this expanded plant production may well result in a period of competitive merchandising stiffer than we have ever seen before.

A flood of new brands and products may be coming. Many new companies may appear. Most firms, we know, are doing extensive postwar planning. All this will tend to increase the competitive pressure which doubtless will send many manufacturers searching for a new distinction in their packages. Some probably will redesign their packages, using a standard glass container as a base. Others may decide on an entirely new package, starting from scratch. We may expect to see an entirely fresh approach to the whole subject of packaging.

This would present a golden opportunity for glass. The use of glass as an alternative and as a temporary expedient during this war period has broken down a great many prejudices against it, and the postwar era should see glass taking a much more prominent place in the packaging picture than ever before.

The demand for a distinctive package should benefit glass for a wide variety of reasons. There is no perfect package—no container is suitable for all purposes—but glass offers many advantages which are not found in other packaging materials.

Glass is inert to most products and therefore does not transfer taste, odor, dissolved substances or the products of corrosion into the commodity. Most other containers are limited as to shape, but glass allows great variety in shape and design, subject only to a few basic geometrical and manufacturing limitations.

Glass is inherently attractive, and the container may be enhanced infinitely by numerous devices. Trademarks or other distinctive designs may be molded into the glass container, which may be of the common transparent "flint" type or may be one of many shades of amber, green or blue. Amber glass protects products, such as pharmaceuticals, which are subject to the action of ultraviolet light. It may be noted that the color of modern glass does not adversely affect the other physical properties or the chemical durability of glass, so an obvious possibility for the future is the development of greater color variety.

For the merchandiser in search of distinction in his package, interesting variations can be achieved in applied color on glass and decorative treatments involving the label or supplementary material such as raffia and foil. These decorative possibilities are subject only to the limitations of designer's ingenuity and the price which the merchandiser is willing to pay. It should be emphasized that the progress of the glass container depends to a considerable degree upon how the container is used to make the package, for the container itself is just one element in the package.

Transparency vital advantage in food field

The transparency of glass is of paramount importance in many fields of packaging, particularly foods. With other types of containers an all-covering label usually must be used. But a label, no matter how attractive, can scarcely compete with the sight of the actual product. The glass container is its own window display for the cherries, peaches, plums, beets, peas, corn, or other fruits or vegetables which it contains.

This extra sales appeal of glass becomes particularly important when considered against the background of the modern trend in food marketing methods which sends the customer herself among the shelves to select, without help or advice from a sales clerk, her own products and brands.

The transparency of glass also offers a specific advan-

2



2—Glass enables the color of the product to shine through in this package family used by Pal and Leader preserves. The color appeal is further accentuated by the brilliant labels. Photo, Armstrong Cork Co.

tage to the manufacturer or packer because it allows the product to be inspected visually at any point during processing, storage and distribution.

Glass food containers can be made attractive enough so that they will be taken directly to the table for serving and, when the contents are entirely consumed, the containers may be re-used—a point which has been found to have great appeal for many housewives.

The advantages of the glass container are such that many manufacturers, now using it for the first time, have decided that its merits more than balance the additional cost of glass. After the war, this cost differential—which now is not great as it once was—may well be reduced further by the increased production of glass, by improvements in packaging lines and by other factors.

The standardization of glass containers, instituted by the WPB, is proving a benefit to all packers and glass manufacturers, especially in the fields of quantity packaging of staple products. Glass containers have been standardized as to shape (body design) as well as size, and these standard shapes are available with appropriate finishes such as side seal, CT (continuous thread) and other finishes which also have been standardized.

Fundamental advances made in glass industry

During the past several decades, and especially during the past several years, the American glass industry has made fundamental advances not only in the basic formulations, but also in the manufacture of glass containers. Postwar years will certainly bring further improvements.

One of the important recent advances made by the industry has been in the direction of reducing weight and at the same time increasing the strength of the glass container. The rather thick walls of the containers common until several years ago were required to give the necessary strength to the containers of that time since they were manufactured with the existing glass-forming equipment. In the past few years, great strides have been made in better utilizing the glass throughout the walls of the container. At least one company is producing a type of glass container that will not shatter even when dropped on a concrete floor. Thus the production of standard shapes of less weight, but with better design and greater strength, than the older types was permitted.

Closely allied with the factors of weight and strength is the element of breakage. But experience with this element, both in production and distribution, has been good. Many packers have for years been handling glass on cold-fill and hot-fill packaging lines without undue breakage. Many lines originally set up to handle other containers have been converted to glass, and are now handling the new container without excessive breakage.

True, a sharp or highly concentrated impact will cause breakage. But other containers under similar impact will become dented or distorted, and if the force is applied at a seam it may open a minute hole, causing loss of vacuum, with consequent spoilage later. It is apparent that proper handling, adapted to the particular type of container used, is necessary on any packaging line.

In distribution, the label "glass" on a carton traditionally tends to command extra respect from warehousing help, truckmen and store employees.

Improvements made in closures

Naturally, the future of the glass container, especially in the food field, is tied closely to the development of the closure. Up to this time, it was the closure that seemed to be retarding the progress of the glass container, and the most troublesome element in the closure has been the cap liner. But this liner has been steadily improved, and with the development of the new synthetic rubbers and other new materials, much further improvement is almost certain in the future. In the past, the necessity of using the different liners for different groups of products has worked against the extended use of the glass container, but it is not too soon to say that the universal liner is on the way.

While the standard side-seal closure and CT cap lined with rubber, synthetic rubber or flowed-in liners doubtless will continue to be used for closing glass, new types of closures also are in the offing. The standard closures in the past have been made of metal, protected on the inside with suitable lacquers and finishes, and lithographed on the outside with attractive designs or instructions for opening. With such closures a minimum of metal is used, and since this metal is not drastically worked in the formation of the closures, excessive distortion or deformation —which leads to corrosion—does not develop. Currently a glass closure with a rubber sealing gasket is being studied on a semi-commercial basis. This closure will permit the development of a food package consisting entirely of glass, except for the sealing gasket.

These improvements in closures, accomplished or on the way, of course apply particularly to the food field which may be expected to use a far larger amount of glass in the postwar period than before the war.

Because of the general improvements that have been made in glass containers and the possibility of further improvements, the breaking down of old prejudices against glass, the general sales appeal of glass, the variety of shapes and designs and color in which glass is available, the versatility of glass in the creation of a distinctive package—because of these potent factors, we may expect to see a substantial increase in the use of glass in all branches of the packaging industry when peace comes.

3—Will they come back? Glass jars of "Olo" paints together with the metal cans they replaced as a war measure. Glass package has reseal cap, permits exact color choice. Photo, Anchor Hocking Glass Corp.

3



Handling glass on the production line

by P. J. Martersteck

The clatter and clank of a high-speed bottling line indicates even to the uninitiated that we are far from the millenium in the handling of glass containers.

Both high and low cost products are packaged extensively in glass, but the problems confronting the packers of commodities and luxuries differ somewhat. The producer handling a low cost product cannot afford to sacrifice economy at the expense of the finished package. He must, of necessity, select a container of standard design and of proved performance. Therefore he is not apt to encounter difficulties with elaborate designs and complex and varied shapes. However, by thus eliminating these sources of trouble the packer is discarding one of the assets of a glass container—flexibility of design.

Bottlers packaging expensive products usually take full advantage of this quality of glass and occasionally may go to extremes in developing complex shapes that cause trouble in the glass plant and on the bottling lines.

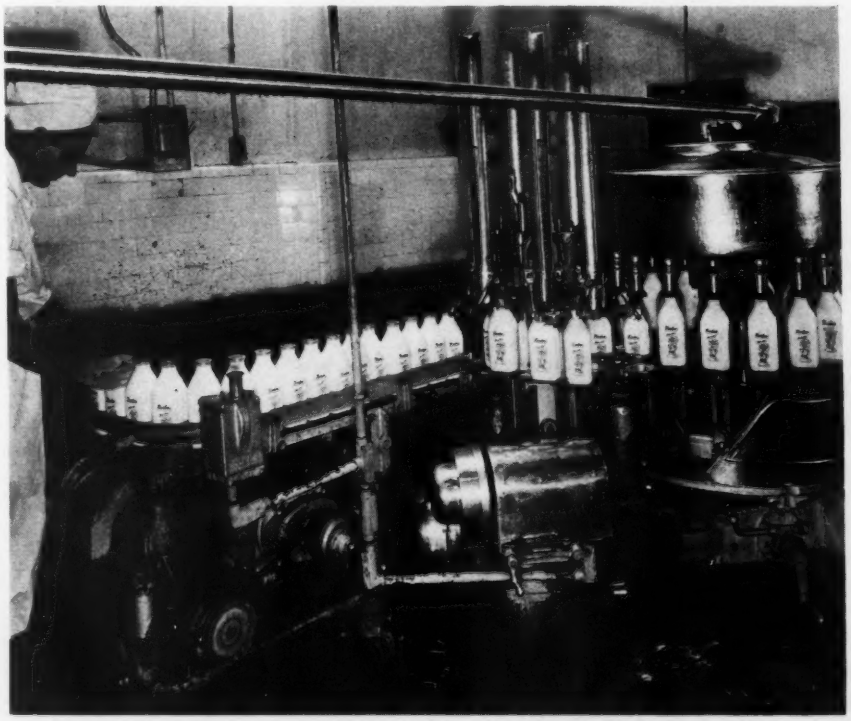
In varying degrees, the packers of high and low cost products suffer from the same chronic bottling ills. Inadequate shipping cartons are responsible for some glass breakage en route to the packer. With maximum loads, better cartons and better bracing are necessary.

After the glass is unloaded from the cars or trucks, it is usually subjected to several impact shocks before reaching the lines. In many plants it is common practice to throw cartons of empty glass a distance of ten feet onto a conveyor or pallet.

The dump table, although usually covered with some resilient material, is practically a torture rack for glass containers. To feed a high-speed line requires fast dumping, and little consideration is given the glass container at this point. The safety hazard in this operation is ever present, and in many plants the employees engaged in the dumping operation are required to wear face shields as a protection against flying glass. Many case unloaders are available, but few are relatively trouble free, and none of the present machines are sufficiently flexible to handle different shapes and sizes.

Filling machines may be designed to compensate to some degree for "leaners" and "rockers," i.e., bottles that are off the perpendicular or that rock perceptibly due to a rounded or uneven base. No filler, however, can accommodate choke necks or bottles that lean or rock excessively. A bottle with a choke neck usually results in a broken filler stem. Stems have been designed which will telescope on encountering choked necks; however, they are not leakproof and obviously leakage will increase as the sliding parts wear. Bell guides on some fillers permit some leaners and rockers to go through the filler. Extreme faults of this type will result in smashed bottles, and broken glass is alway a menace.

The capping machine is usually the most rugged piece of equipment on the line. Compact and sturdy, the well-designed capper will handle all but the most defective ware. Torque indicator wrenches may be used to distinct



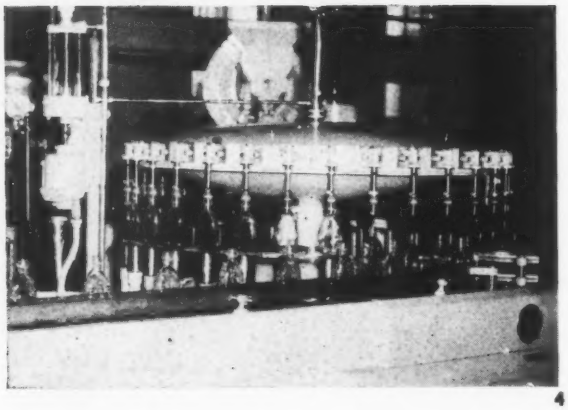
1—Innovations in design can help solve problems of handling glass on the production line. The new square milk bottle, shown here as it is filled and capped, is lighter, stacks better in cartons, and takes up less room in the cartons and in refrigerators. Photo, Thatcher Manufacturing Co.



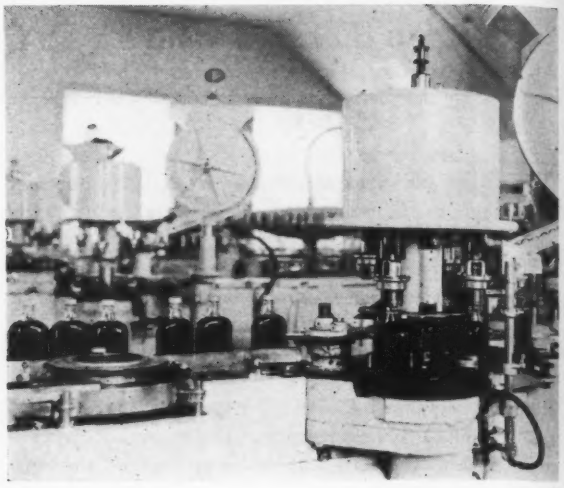
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5

2—Before filling, bottles should be checked for capacity, weight and for visual defects. 3—A dump table receives bottles which are shipped neck down to the bottling plant. 4—High-speed filling machines such as this have capacities up to 120 quarts per minute. 5—Here substitute wood caps are fixed on bottles. Photos, Jos. E. Seagram & Sons, Inc.

advantage in properly adjusting capping machines handling screw caps in order to reduce cap breakage and ensure good seals.

Sharp fins on the neck finish result in trouble in the capping operation. If plastic caps are being used, sharp fins may shave off particles of plastic which drop inside the bottle. If metal caps are used, they may lock on or may not form a tight seal. "Jump" or "skip" threads on the neck finish may be utilized to overcome this defect.

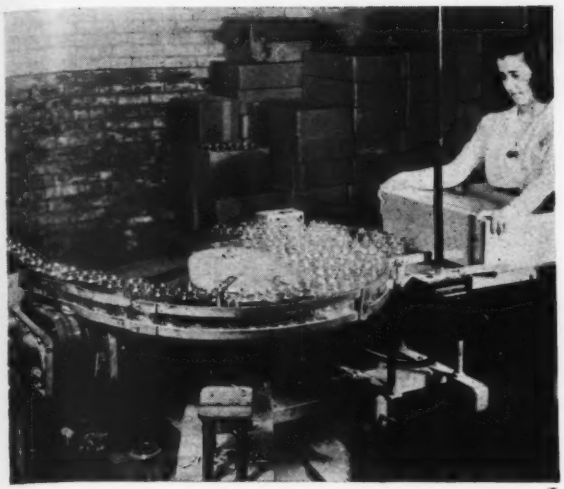
While fillers and cappers usually employ a rotary motion, some labelers operate with reciprocal motion. It is in the labeling operation that leaners and rockers and bottles with concave or convex sides cause serious trouble. Some labelers pick up the container by the neck and move it through the labeling machine in a series of two or more steps. Other labelers let the container rest on its base. The former method eliminates the rocker bottles as a source of trouble, but difficulty is encountered with the bottle that is out of perpendicular. The latter method will not compensate for either defect.

Case loading machines readily adaptable to various sizes of containers will soon be available and will reduce the impact shock considerably. The present method of hand loading is hard on the glass container, and in a great many plants careless handling at this point results in a fair percentage of labels being torn, scratched or misplaced as the bottles are slid or dropped into the cells of the carton.

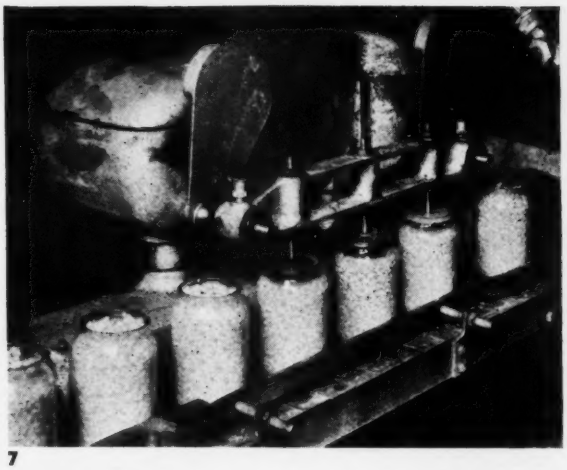
Carton sealers are relatively simple machines—the principal source of trouble being the glue-feed mechanism. If a serial numbering device is incorporated into the case sealer, then this too will require considerable maintenance. Irregularities in carton surfaces place a strain on imprinting rolls and make it difficult to obtain clear, uniform printing.

When the bottling or packing plant employs conveyors to transport the filled cartons, the converging of the production of many high-speed lines into one main carrying line presents a nice timing problem. It is, of course, highly desirable to design the conveying system so that a minimum of employees is necessary to prevent jams. Electric eyes, or photo-electric cells, flapper switches, and time-delay relays are all devices commonly used to ensure the smooth converging of many lines into one. Despite the most meticulous precautions, jams in conveyor lines do happen and cases frequently are thrown off the line. If one container breaks, and the contents are fluid, the whole case must be repacked, perhaps relabeled.

The many hazards above-mentioned may be overcome



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8

6—A new type of glass "unscrambler" takes single jars from a crowded mass and sets them marching single file on a conveyor down to the filling line. Photo, Owens-Illinois Glass Co. 7—A machine which accurately measures fill of corn into glass jars. Photo, Owens-Illinois Glass Co. 8—Cartoning bottles. Photo, Jos. E. Seagram & Sons, Inc.

or at least reduced to a minimum by controls instituted at the glass manufacturer's plant. While the glass industry has devoted a significant amount of time and financial support to research in an endeavor to produce better glass containers, the industry can be encouraged by many factors—a principal one being that much remains to be done. Complaints from users that ware is defective too often results in the glass manufacturer checking and changing every possible adjustment in an effort to eliminate the source of the complaint. There are, at the present time, too many variables to control to ensure the production of not just "commercially good ware" but satisfactory ware from the user's viewpoint. More rigid specifications which should be developed and promulgated by the glass manufacturers themselves might at first glance seem a suicidal move, but must inevitably result in improved, lower cost containers, which will be better able to compete with other types of containers. Specifications can be developed which will eliminate or materially assist in eliminating the hazards of packaging in glass at high speeds. An extremely vital alliance and one which is lacking today is the close collaboration of glass manufacturers and packaging machinery manufacturers.

Certainly the two dominant sales qualities of glass as a container are its transparency and flexibility of design —obviously two qualities appealing only to the ultimate consumer. Yet how sympathetic is the glass manufacturer to a cry from his customer that he is having labeling difficulty which admittedly does not affect the utilitarian value but definitely reduces consumer appeal. The consumer obviously bases his preference for containers on the finished package only, while the production superintendent bases his selection on packaging costs.

Clarity and brilliance are precious assets to a glass container. Blisters, seeds, and wavy surfaces detract to a considerable degree from the latent appeal of glass. Furthermore these defects are indicative of the structural strength of the container and are signals to the manufacturer and the user that corrections are in order.

It is logically concluded, therefore, that producers in the glass container industry must, if from a survival viewpoint alone, make it their immediate business to produce containers that will withstand a maximum of impact and thermal shock, and will fill, cap, label, and ship well. In order to accomplish these ends they must prepare themselves to recommend to their customers the most satisfactory methods of handling glass containers, the proper types of caps, label papers and glues and adequate shipping containers.

Glass manufacturers will benefit by educating the users of glass so that while they will take full advantage of the excellent molding characteristics of glass, they will also recognize its limitations. Sharp facets, or decorations, short radius curves, flat panels, compound curved labeling panels—all are sources of trouble.

These same basic design defects cause many a machinery manufacturer to shy away from mechanizing a production line handling containers which embody these faults. If an unusual shape is desired, it is recommended that the tentative design be submitted to the glass supplier for his suggestions and possible revision. If some of the defects above-mentioned are found and removed, the improved design will not only assist the manufacturer but pay dividends to the user.

Standardization of glass containers

by Dr. J. H. Toulouse

Glass was soon recognized, during wartime exigencies, as a probable substitute for more critical packaging materials. This was due primarily to the realization that glass was practically an all-domestic material and that glass containers required only a relatively small amount of tin, steel and rubber for closures. However, it was necessary to find some means not only of facilitating production of glass containers but of reducing the small amounts of critical materials used. Thus, standardization of glass containers became an important wartime measure through Limitation Order L-103 of the War Production Board.

Long before Pearl Harbor, standardization was being talked about. One government agency, the Simplified Practice Division of the Bureau of Standards, under W. E. Braithwaite, had been talking standardization for years (see p. 104). Finally, with the cooperation of the National Preservers Association, the National Pickle Packers Association, the National Peanut Butter Association and the Glass Container Association, a series of jars and bottles was developed and suggested as standards.

An entirely independent venture was that of the leading brewers' groups which had already suggested a reduction of bottle sizes and styles from nearly 100 to 32. These latter sizes ranged from 7-oz. capacity to ½-gal capacity and are available in seven bottle styles.

When the Glass Container Section of the WPB was organized by the writer, these groups and many others placed their work at the Section's disposal, but before action could be taken, several important rules of standardization had to be developed for the user's protection:

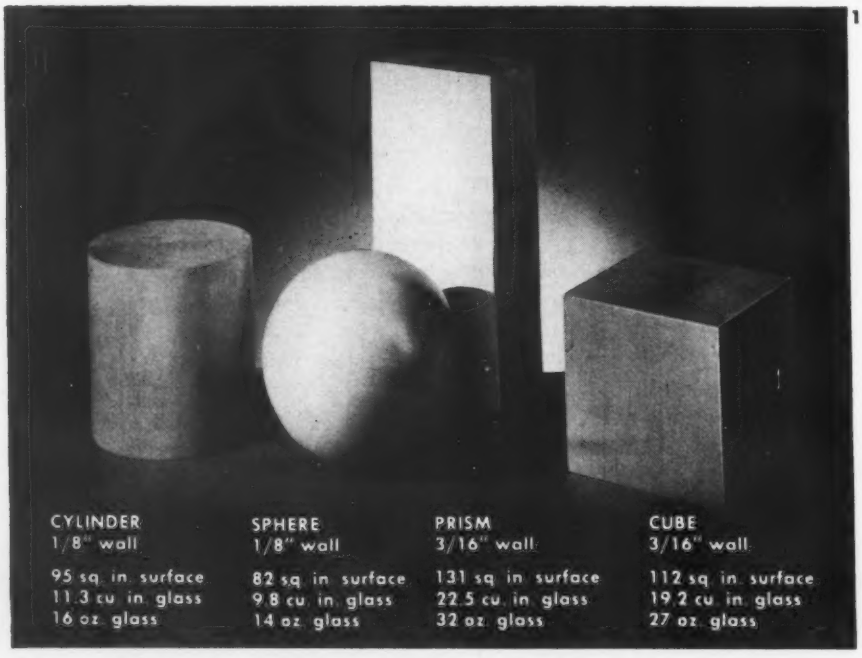
1. Standardization could be associated only with a saving of critical materials or production time.
2. Production must be increased without widely increasing facilities.
3. Designs had to be such that any glass container manufacturer could make and any packer use them.
4. As finally developed, when a product was specified for a standardized package, all trademarked containers, whether owned by a glass manufacturer or a glass user, were to be abandoned.
5. Only those products in whose container use a net gain to the war effort was shown, were to be required to use standardized packages.

In this both the glass container manufacturer and the user gave up much. The former relinquished his ability to make special shapes and sizes of almost any design. The latter gave up the shapes that were his trademark.

It was claimed for standardization that it would increase packaging capacity to help take care of many products which were forced from more critical materials. It was claimed that it would reduce the amount of tin, steel, paper, rubber and protective coatings used for closure making. It was claimed that the lighter, standardized bottles would be stronger. It was expected that they would handle easier and faster on filling lines. The WPB requested a program with these aims in view.

Standardized bottles increase production

Figures released in October 1943, by the Glass Container Association, prove the increase in production. It cannot



1

1—Lower ratios of surface-to-volume allow for lighter weight without any sacrifice of strength. The wood models shown are based upon a capacity, inside the walls, of 60 cubic inches. Dimensions of the prism are arbitrary. Wall thicknesses are comparative to give approximately the same strength. Photo, Owens-Illinois Glass Co.

be claimed that all the increase was due to standardization, for other technological advances have also helped. Nevertheless, the four-fold benefits of standardization (higher production speed where weight was reduced, lighter average weight, longer runs and more efficient use of molds) account for a great deal of the 13 per cent increase in production of 1942 over 1941, the 33 per cent increase in production of 1943 over 1941 and the 48 per cent increase for 1944 over 1941.

Among other benefits of standardization were simpler stocks, longer runs, greater quantities per carload.

When bottle shapes were standardized, sizes of openings were also reduced in order to save materials. Since the amount of metal, tin, paper and coatings used in the closure usually varies as the square of the opening (being an area function), the reduction of cap size by only 10 per cent in the diameter afforded a material savings of about 35 per cent. With lightening of tin coatings in general, and the elimination of tin in many instances, this area reduction meant that less than half as much tin was used for the same number of containers. Even though it increased their own production, users gave up enough steel to keep a small shipyard busy.

Standardized bottles deliver more goods

The same report of the Glass Container Association already mentioned has revealed an advantage expected of standardization but hitherto unable to be measured—a capacity for products beyond the increase in production. Standardization Order L-103 eliminated the smaller sizes for most products. By this means the average size container, which held 12.7 fl. oz. in 1940, has risen to 18.3 fl. oz. in 1943. Thus the 33 per cent numerical increase of containers in 1943 compared to 1941 has resulted in a 60 per cent increase in capacity. Even with these tremendous increases, many users have had such difficulties in getting glass containers that WPB has rationed certain industries. But if it were not for this 60 per cent increase in capacity for products placed in glass containers, some industries would have had no containers at all.

The foregoing has shown the wartime effort in three great directions: (1) increase in production without increase in facilities, (2) savings in war materials and (3) carrying more goods to market with fewer containers. Let us now examine some features worthy of retention.

Increased filling speeds

Experience on filling lines, no matter what the container material, has shown that a symmetrical container, such as a perfectly round shape, can be handled with the greatest speeds. When the container is oval or oblong or tapered, slow-downs and stoppage occur, with broken or dented containers, spilled product and lost time and effort. The standardized bottles were therefore round.

As to filling speeds, we can let a few examples tell the story. One processor who had been using a private design pint flask was able to fill about 120 cases each hour, but as soon as he changed to the Victory designs, his filling speeds jumped to 200 cases per hour, even with less experienced help. This increase of 66⅔ per cent



2

2—Hypothetical packages show that individuality need not suffer from WPB glass container standardization. Bottles below vary in shape. Standard bottles (upper row) keep identity by well-designed labels.

meant more efficient use of machinery, labor and space, and is a saving that would be lost if the postwar change should be made in the reverse direction.

Another user of glass found his production increasing from 2300 units to 2700 units in the same work-day, when he changed from an oblong metal container to a round glass container of the same capacity. (See also *Consider Production When Designing*, p. 64.)

The food groups originally requesting the standard bottles and jars have realized the gains they had hoped for. Faced with mounting costs for labor, raw materials and all supplies, and with untrained and unskilled workers entering into all phases of the production, the standardized bottles, by their higher speeds of operation, easier handling, low losses and other benefits, have helped maintain costs in spite of the difficulties.

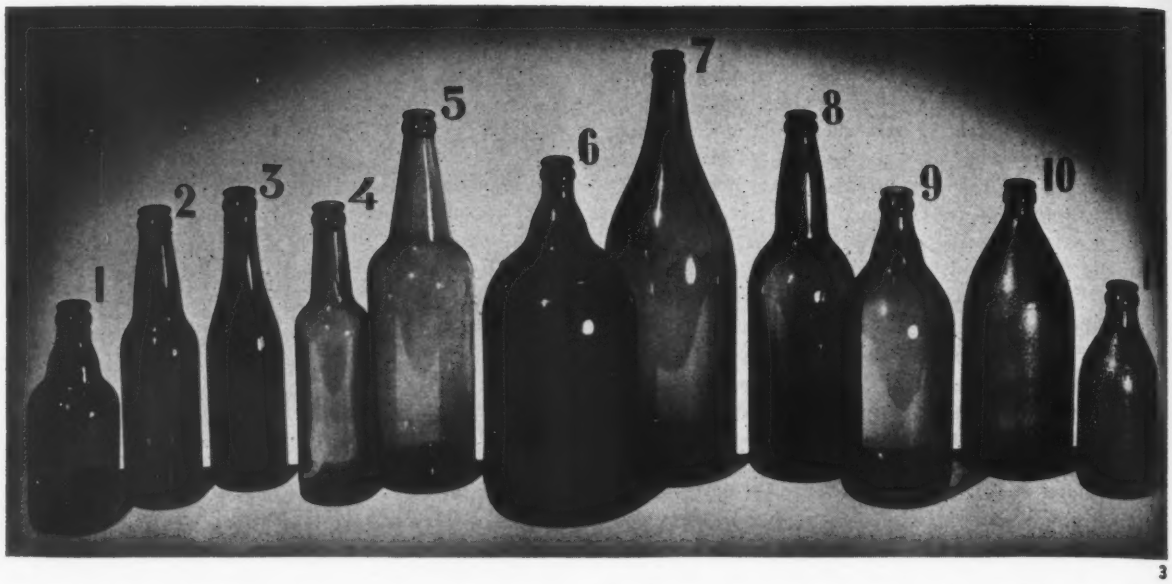
Lowered packaging losses

The handling of war shipments is often cited as an example of extreme harshness, yet standardized bottles have stood the test. From plasma to beer, from hospital supplies to condiments, from mosquito lotion to dishes, glass has gone all the way to combat. Whenever hospital purity or extreme corrosion resistance was demanded, glass was indicated. We are told of losses of "two bottles in 27,000 cases," "27 bottles in 60,000 cases shipped 9000 miles."

The breakage loss on production in one distillery has been cut in half; others have done even better. One soft drink bottle, highly standardized for years, normally averages 60 or more trips per bottle, costs less than $\frac{1}{10}$ of a cent per customer use. Beer bottles normally average 30 or more trips and are good examples of standardized containers adopted by WPB.

With benefits in production, weight reduction, shipping space and many other factors, it is expected that standard bottles will find a permanent place in the container field. Whenever the margin of profit is small, container and use cost must be held to a minimum.

Special design bottles have their place, but they do not



3

3—Variety in shape, type and usage is available even with WPB standardized glass containers. This group for malt beverages includes: (1) 12-oz. Steinie beer bottle; (2) 12-oz. export beer bottle; (3) 12-oz. select shape beer bottle; (4) 12-oz. ale bottle; (5) 32-oz. ale bottle; (6) 64-oz. Steinie (unpasteurized); (7) 64-oz. select type (pasteurized); (8) 32-oz. export; (9) 32-oz. Steinie; (10) 32-oz. and (11) 12-oz. single trip bottles.

economically include processed or similar packaged foods, beers, soda waters, essential drugs, household supplies and similar small-profit-margin items. For the most part, wines and distilled spirits will be placed in containers that lower filling costs.

Standardized containers stronger, lighter

An engineer does not have to be told that a sphere is the strongest mechanical shape, and that a cylinder is next in line. The non-engineer who wishes to justify a non-cylindrical shape may want proof. In order to give proof, both theoretical and practical, let us quote a few formulas and actual tests. When a circular plate—as an example of the side of a flat bottle—rigidly held along its circumference, is placed under a load, the theoretical deflection is calculated by:

$$3W\frac{(M^2-1)}{16\pi EM^2t^3}\left\{4a^2 - r_0 2 \log\frac{a}{r_0} - 3r_0{}^3\right\}$$

For a cylinder, as for standard bottle, the maximum deflection is only:

$$\frac{0.135PR^2}{E\,t^3}$$

We need not identify the constants, or work out the problem, but the curious will find that the flat plate is badly distorted by a weight that will not measurably affect a cylinder of the same thickness and constants.

The proof of the formula is in physical tests of glass containers. Two comparisons are cited in the paragraphs which follow.

In a food jar much depends upon certain relations of shoulder, side walls, neck shape and other parts to develop the ultimate strength. A certain non-standard jar violated some of these rules of strength. On use, it gave trouble, and upon investigation it was found that the *weakest* standard jars were 60 per cent stronger than the *strongest* non-standard jars, and 125 per cent stronger than the weakest non-standard jars.

In another instance the old familiar pint whiskey flask, with one concave side, was compared with the new standard, but lighter, double convex flask. The former had always been a trouble maker, hard to make, difficult to fill, slow to handle. Tests were made to compare the impact resistance, using a 1.8-lb. steel hammer-pendulum. The average breaking point of the old bottle impacted on the concave side was 2.65 units, that of the convex side of the same bottle 6.43 units, or 143 per cent greater. Other *lighter standard* bottles ranged from 5.33 units (100 per cent stronger) to 10.38 units, (or 292 per cent stronger). These data can be duplicated.

Even so seemingly minor a detail as stippling has a function. The very lightweight, one-trip bottles used for single trip beers are stippled. Many users have disliked the stippled bottle because of an added problem in labeling, but it has been found that stippling can add 50 per cent or more to the resistance of the bottle to abuse. A light stipple has been developed to maintain strength and allow easy labeling.

Standardized bottles can be individualized

Standardized bottles need not be so regimented that they will look monotonously alike. Metal food containers have been standardized in shape for years—yet label treatment makes each one different. Attention is drawn away from the shape of the glass container, and placed both on the label treatment and the contents of the bottle. A glass container is a "view container" whose contents reveal themselves at the point of purchase. A simple glass design becomes a show case.

Handmade glass bottles

Despite the growth of standardization in the glass container field, certain luxury products demand—and deserve—the distinction of a more precious package. For them, the handmade glass bottle is the ideal container.

For the manufacture of the great majority of the glass bottles employed in current packaging operations, modern automatic machinery is used. Glass is made in immense furnaces with materials which are mixed by the ton. The molten glass is then fed into huge automatic machines and blown accurately to conform to the shape of the molds within the machine. However, the ancient art of glassmaking still occupies a prominent—and an increasingly important—place in the packaging picture.

Where extremely fine work is essential, and where limited runs of such work are required, handmade and semi-handmade glass containers are widely used.

Until the start of hostilities in Europe, a limited quantity of French, Australian and Czechoslovakian glass falling into these categories was imported each year. Since September, 1939, however, American manufacturers of handmade glass have shown their ability to meet all the needs of the market, and virtually no dislocations have occured due to the cutting off of former imports.

Manufacture of handmade glass

In the process of making a bottle by hand, the glass blower inserts the blowpipe, an instrument about 4 ft. long, into the pot of glass and withdraws a sufficient amount for the bottle, at the capacity required. A hand skilled in feeling the weights is imperative, as too much

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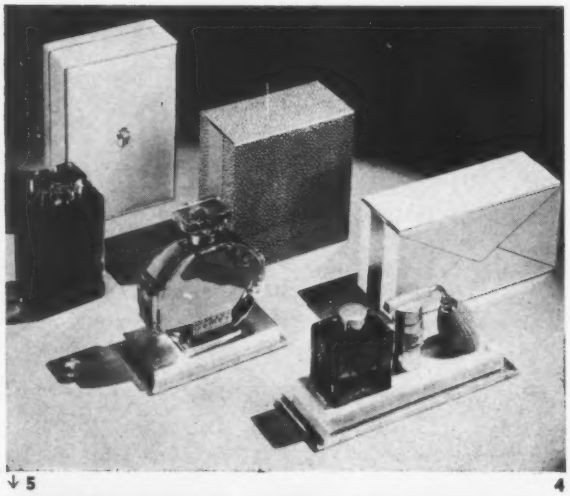
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Bottles like these are made of carefully selected materials. 1—Simple, pyramid-shaped bottle. Bottom and neck are fully annealed for maximum strength. Glass stopper has a distinctive design. Photo, Kimble Glass Co. 2—Decorative decanter-type bottle for Charbert cologne is designed for dressing table use. 3—Unusual glass bottle, hand molded, pentagonal in shape. Photo, Kimble Glass Co.

glass would decrease the capacity of the bottles, while too little would increase the capacity, besides making it too frail for average handling.

The glass is then rolled on a smooth flat surface to eliminate any wrinkles that may have formed while the glass was being taken from the pot, leaving an almost perfect piece which is placed in an iron or steel mold. The mold is made in two parts, each containing a cavity of a size equal to half the size of the bottle. There is a bottom plate for a base.

When the mold is closed around the glass, the blower sends sufficient wind through the pipe to spread the glass evenly against the walls of the cavities, forming the bottle. The mold is opened immediately and the bottle is taken out with pincers and then weighed. The necks are reheated and tooled to form a proper finish.



↓ 5

4



If the bottles are allowed to cool rapidly, they become extremely brittle, causing them to break from the least vibration, so they are placed in slow moving lehrs that cool them gradually, giving them the proper temper.

The bottles which pass inspection have their stoppers ground-in and tied to the necks to ensure against the possibility of interchanging, which would cause leakage and evaporation of contents.

While this description of the process is basic, it is susceptible to virtually infinite variations to meet the very specialized requirements of differing designs.

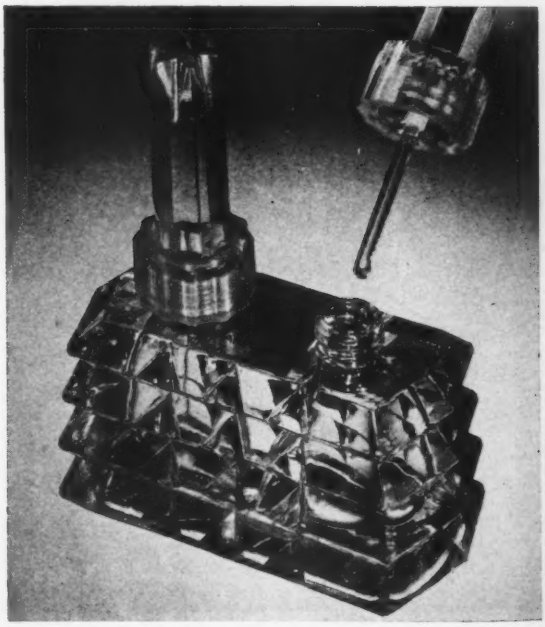
Glass for hand-blown bottles is usually made of very carefully selected and blended materials fused in small batches in covered pots free from the impurities of factory air. Extremely delicate and sparkling effects can be achieved because of the high quality of the glass utilized, as well as because of the interesting effects in design attainable by hand-blowing operations when they are performed by skilled workmen.

Private vs. stock molds

The factor of difference in cost between containers from stock molds and from private molds involves a situation for hand-blown bottles quite different from that for bottles made by machine. Since only one mold is used by each blower, and since hand-blown bottles are produced in relatively short runs, the cost of molds for private-mold bottles is generally lower when they are made by hand. This factor alone, however, would seldom be sufficient to swing the decision one way or the other.

4—Richard Hudnut perfumes are attractively bottled and gift-packaged in a variety of shapes and designs. Sometimes provided with useful atomizer. 5—Luxor's "American Beauty" cologne comes in this ensemble type package with American Beauty rose motif on both bottle and box. 6—A two-cavity hand-blown bottle with dual closure finishes and plastic stoppers having glass applicators. Photo, Carr-Lowrey Glass Co.

6



Tumblers as packages

by Frasier Smith

In the years preceding America's entrance into the war, the tumbler had gained considerable popularity as a food container. However, due to the high ratio of closure material to tumbler capacity—and the consequently greater use of war-scarce metals when compared with standard packers' jars—wartime shortages of certain metals have led to restrictions on the use of tumblers for packaging certain products.

There are few products for which tumblers are unsuited, for they have been used in packaging processed cheese, cottage cheese, jelly jams, peanut butter, salad dressing, horse radish, soup mix, cocoa, tea and shoestring potatoes—this list could be extended.

Many attractive designs in a wide range of capacities will be obtainable from stock molds; and when the quantity used justifies it, a special design may be evolved. Also a number of efficient closures are available, both side and top seal for either band or bead style finishes used with or without vacuum.

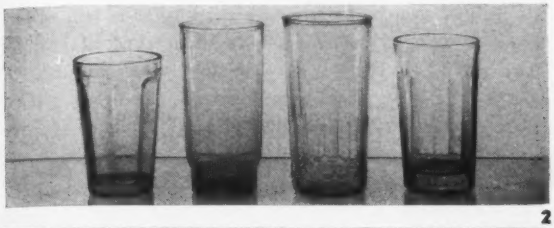
The tumbler's chief claim to packaging consideration, of course, lies in its adaptability to re-use. This re-use takes two forms: first, by the obvious employment of the empty container as a drinking glass; secondly, as a container for homemade jellies and jams. In many cases, these tumblers may be so attractively designed as to make their use for these purposes acceptable to housewives of considerable discrimination.

The application of intelligent, imaginative design, with due consideration for the nature of the product to be packed, may add much to the sales appeal of the package and to its subsequent acceptance as a piece of useful everyday household equipment.

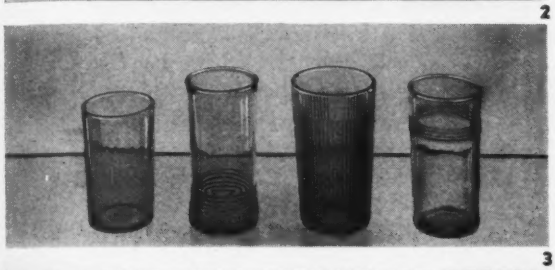
There are two principal approaches to this merchandising problem. Variation in form and ornament may be incorporated into the molds, or decoration may be added in the form of applied color, usually fired on to become an integral part of the tumbler, unaffected by water, heat or ordinary wear. This color may cover the entire surface, or may be applied in a variety of patterns.

The obvious appeal of the re-use features appears likely to ensure for this type of container an important place in the postwar packaging picture.

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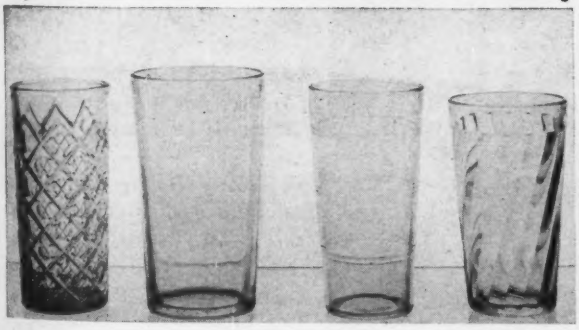
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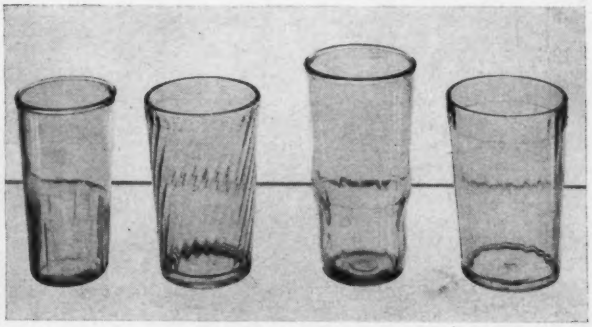
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1 & 2—Re-use features make tumblers important packages with a big postwar future. Many distinctive shapes are available in private molds. 3 & 4—Applied color is effectively employed for tumbler decoration. 5 & 6—Stock molds offer wide choice. Photos, Hazel-Atlas Glass Co.

Specialized glass containers

Specialized glass containers are widely varied in appearance and in application. These include vials, ampuls, numerous bottles, etc. All of these containers fulfill a practical function, and many of them are decorative besides. Modern methods of fabrication have resulted in evenness of wall and freedom from distortion of vision without sacrificing strength in the group of glass containers made from machine-drawn glass tubing.

Glass vials are widely used for packaging liquids, powders and tablets when a small, convenient and light container is required.

Glass ampuls are accepted in pharmaceutical practice as the best, and often the only, practical means of providing utmost convenience combined with absolute sterility and maximum protection over an indefinite time.

Standard types such as those illustrated are ordinarily available from manufacturers' stock. Special requirements, of which there are many, can usually be met with little difficulty or extra cost, as the machines used for fabricating these articles are remarkably adaptable. Thus a considerable range of special sizes, designs and finishes is available on order.

Sales-stimulating variations of the specialized glass container are the miniature, hand-blown, perfume containers illustrated in Fig. 1. Each of these containers incorporates a stopper ingeniously screw-threaded and sealed with a ring of rubber so that, once the stopper is screwed into place, the bottle is leak- and evaporation-proof. A simple unscrewing motion removes the stopper which, with its elongated, smooth end can be used as an applicator. A special method of plating or "metalizing" has been developed which gives a highly polished appearance to the container. Designs are limited only by the imaginative scope of the artist and the craftsman's skill.

The invention of the screw cap dropper fitment, illustrated in Fig. 2 has caused the older type of stopper (used for bottles with a cork-finish) to be cast aside almost completely. The new fitment, or dropping part, which gives a perfect seal with the bottle consists of three parts: the squeezing portion or dropper bulb, the screw cap and the dropper glass.

The dropper bulbs and the screw caps are obtainable in all colors. The bulbs may be of natural rubber or of a special synthetic stock, the latter being recommended for use with oily preparations. This substance is also noted for its resistance to all climatic conditions.

The caps are designed to give a proper fit with the rubber or this special synthetic when assembled, and they incorporate convenience features for handling.

The dropper glasses are precision made—the ball point style for the eye and the blunt style for the nose or ear. The U. S. P. dropper glass is recommended in cases where the number of drops delivered must be accurate.

Vials can be made with flat or oval bodies, with round bottoms, open at both ends, with neck finishes modified to take a variety of closures. Ampuls of special styles,

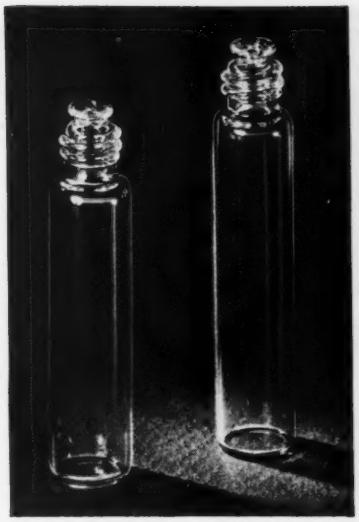


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1—These tiny glass containers, designed for merchandising rare perfumes, range in capacity from a few drops to an ounce. Stoppers, made of molded glass, or fabricated by a patented process from sea shells, are interchangeable because they are screw-threaded and sealed with a rubber ring. Photo, Glass Industries, Inc.



2



3



4

2—Three-piece dropper with a spatula applicator. Photo, Pennsylvania Glass Product Co. 3—Small vials with constricted opening and screw-thread finish. 4—Shell vial, basic form of the vial family. 5—Patent-lip vial, used with a cork or rubber closure. 6—Screw-cap vial uses a metal or molded plastic screw closure. 7—Ampuls, made of glass tubing may be modified to meet special requirements. Photos 3 to 7, Kimble Glass Co.

tolerances and sizes are often manufactured to order.

Glass vials and ampuls offer attractive possibilities in labeling. Metal or paper may be used, or the design and inscription may be printed directly on the glass itself. If permanency is desired, colored ground glass in suspension may be fused into the vial surface.

Ampuls especially have come into wide use among our armed forces and elsewhere as a convenient means of distributing small portions of drugs and other liquids.

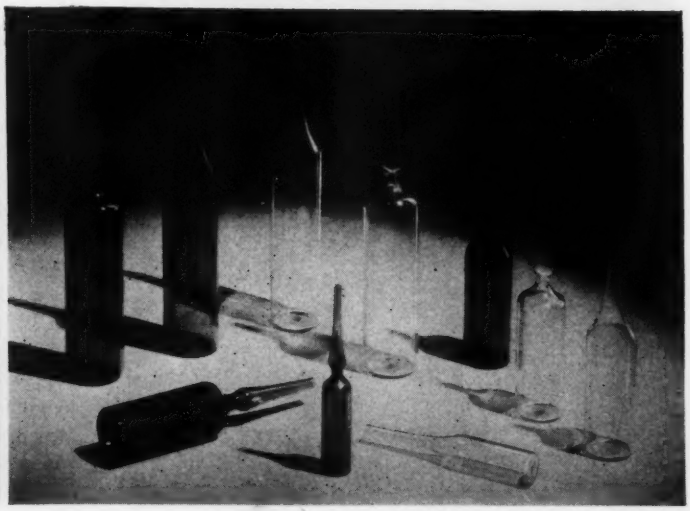
A long vial of small diameter with a special finish makes an admirable iodine applicator. Vials and tubes with a closure at each end and a division in the middle have been developed to contain two different chemicals intended for mixing at the moment of use, as in photography. Sealed glass tubes make individual sterile containers for sutures and ligatures. Vials or small glass tubes are sometimes used as inner containers in more or less complicated assemblies. A simple and familiar ex-

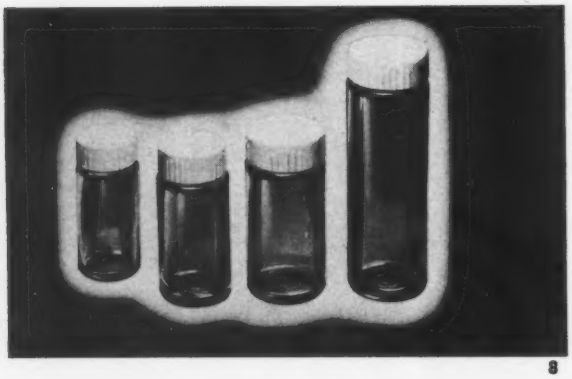
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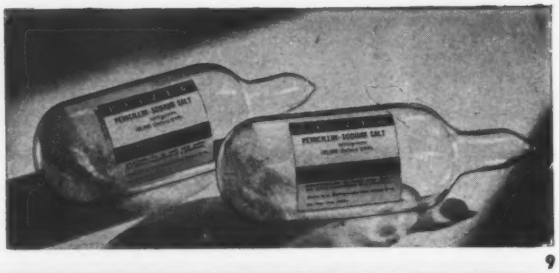


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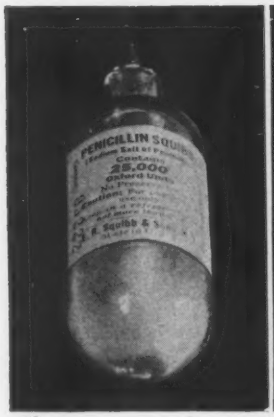


12

8—Machine-made amber glass capsule bottles, molded caps. Photo, Armstrong Cork Co. 9—Giant ampuls for 100,000 penicillin units. Photo, Chas. Pfizer & Co., Inc. 10—Bulb-shaped ampul for 25,000 penicillin units. Photo, E. R. Squibb & Sons. 11—Ampul with constricted neck. Photo, Merck & Co. 12—(Left center) Containers for blood plasma; (right) bottle holds blood before extraction of plasma. 13—New method of printing directly on glass ampuls will be commercially available when peace comes. Photo, Decorated Containers Co. & Harris Labs.



9



10



11

12 ↓



ample is the library-paste jar which utilizes a glass vial as a water and brush well.

The vials illustrated in Fig. 3 are appropriate for containing iodine or the like. The special feature is the neck with screw thread finish, very constricted opening and relatively heavy lip. The vials are fitted with ordinary screw caps and when the cap is removed the vial itself serves as dispenser and applicator. Applicator vials are particularly adapted for use in the armed forces and are equally suitable for first aid kits or home medicine cabinets in civilian life.

Blood plasma has been established as an essential in the medical profession. The armed forces are requiring huge quantities, and hospitals and civil authorities are taking care to have sufficient supplies available.

Whether for military or civilian use, blood is collected from volunteer donors, and the plasma is prepared in the same way for both military and civilian needs. The bottle shown at the right in Fig. 12 is of the type used almost universally, for collecting blood and for the initial steps in processing. Military authorities have set up standards for the bottles used to contain the prepared plasma and the distilled water which must be available at the point and moment of use. An example of such a container is shown at the left, Fig. 12. Commercial firms supplying hospitals and other civilian customers use containers made to their own specifications. The center bottle in Fig. 12 is in extensive commercial use to contain prepared plasma and distilled water.

Penicillin, one of the latest and most widely publicized developments in the medical field, has demanded unusual types of glass containers. Absolutely sterile packaging operations are most imperative for this product. Although no unified method of packing has been adopted or specified, glass is the accepted container. Leading producers use flame-sealed ampuls or sealed vials.

Considered as a package, a glass container is as successful as its closure, and the success of the closure depends upon the finish of the bottle or jar, the closure form and fit and the seal effected by the liner of the closure.

The *finish* of a glass container is the region designed for the application of the closure. It is so called because, in the old hand-blowing days, it was the last part of the bottle to be shaped.

Since this finish is the bridge between the glass bottle industry and the closure industry, it is obviously essential that the dimensions of the finish be common property of both manufacturers. For this reason, the Glass Container Association standardized all of the types of commercial finish for which closures are made, and the specifications of these finishes were made available for the guidance of all producers of glass containers and closures.

These finishes may usually be applied to bottles of any design. So far as the prospective purchaser is concerned, all he has to do is to determine the type and size of bottle or jar he desires and the type and size of closure. When the shipments of glass containers and their closures arrive at the plant, the GCA standardization of finishes makes possible an accurate fit.

Approximately one hundred finishes have been standardized. These are designed for all commercial closures. In the following section describing the closure field, it may be taken for granted that the proper finish is in the hands of the glass manufacturer.

Types of closures

Primary closures—The primary closure of a glass package is the one that has any portion of its inner surface exposed to the contents. Its function is to seal the bottle and to remain securely in place until the consumer opens it. Every primary closure comprises:

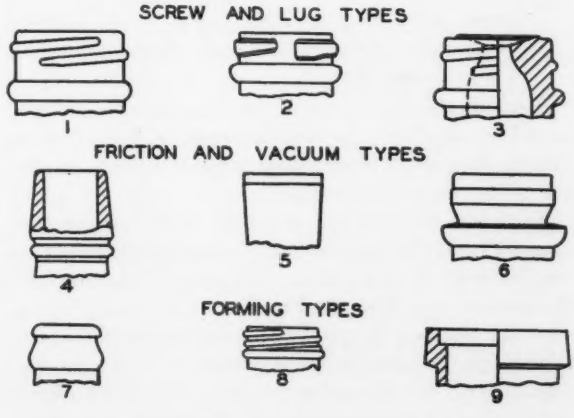
1. A sealing surface, to be pressed against the sealing surface of the container
2. A cover portion for the mouth of the container
3. Some means of securing closure to container

The sealing surface of a closure is usually a gasket or liner (that is not affected by the product) backed with a compressible material which will conform to the contour of the sealing surface of the container. The gasket may be a single material which combines both the "product resistant" qualities and cushion (compressible) qualities —for example, rubber, cork, etc.

The first thing the packer must know about his closure is, whether it provides the degree of sealing required by the product. Properly applied, a closure may be airtight, liquid-tight or simply siftproof. It may be designed to hold internal pressure of varying amounts, to vent and re-seat after venting, or to hold a vacuum. The degree of sealing depends primarily upon the nature of the material used for both liner and backing and the pressure exerted by the cap on the liner.

Types of closures may be more clearly discussed by classifying them according to the methods used to secure them to the finishes. The sealing surface of the bottle may be on the inner surface of the neck, on the top of the neck or on the outer surface of the neck. Therefore, closures are designed for inner seal, top seal or side seal. The *inner* seal is formed at the inside periphery and below the inner edge of the container mouth. The *top seal* is formed on top of the container rim. The *side seal* is formed on the outside periphery and below the outer edge of the container mouth. Thus classified, closures fall into five types:

1. Friction closures: These, forming inner seals, may be tapered, ground-surface, glass plugs. The most popular friction closures are cork stoppers. They may have straight sides (wine and whiskey), tapered sides (miscellaneous jugs and flasks), champagne style or cored for use with sprinkler tops or applicators. The corks may have tops of plastic, wood, metal or wood covered with metal. Side seals by friction only are most common on tumblers. On jars, combinations of side friction and vacuum are frequently used, and the glass finish is often provided with a ledge for pry-off opening. Vapor vacuum, steam vacuum or other vacuum-sealing processes often combine friction side-sealing together with vacuum sealing.
2. Screw closures: May be deep or shallow caps, the deep screw having a skirt about one-third deeper than the shallow. They may be single shell, with



Representative standard finishes which may be employed for bottles of any design: (1) Shallow continuous thread. (2) Two-lug American seal. (3) Sprinkler top, made entirely of glass. (4) Brandy cork. (5) Tumbler friction. (6) Deep friction "pry-off." (7) Crown (8) Roll-on. (9) Band.

the threads exposed; double shell, with the threads concealed in an outer casing; or the outer casing and concealed thread may be made of a single piece of metal. They may be of metal, or plastic, or both; in this time of shortage of critical materials, wood, compressed paper pulp and clay are also undergoing experimentation to develop commercial screw closures made of them. The caps may be knurled, semi-knurled or unknurled. The skirt may have an outwardly rolled edge, a raw edge or a turned-in rolled edge. The top may be domed, partially domed, flat, or have a depressed ring. Lug caps are variations of screw caps, since the lug acts as an interrupted thread. The lug may be made by indentations in the skirt, or by turned-in projections on the edge of it.

3. Formed closures: The most familiar of the caps formed on the finish of a bottle is the crown cap, used for beer, carbonated beverages, condiments. Another type of formed cap is the *roll-on*—a piece of ductile metal in which the threads are formed by the capping machine (during cap applications at the packer's plant) to conform to threads on the finish of the bottle. Another type of formed cap is the chuck-crimped type where the chuck on the capping machine collapses or squeezes the skirt of the cap, or the gasket in it, against the side-sealing surface of the finish.
4. Vacuum only: Caps, under which vacuum may be obtained by special sealing machines, by cooling and contraction of hot packed product, or by some combination of these methods.
5. Miscellaneous and combination caps: The band-cap is an example of this type. It is one in which a metal band applied with a sealing machine has its lower edge crimped under a ledge on the container finish and its upper edge crimped over the top corner of a sealing disc or cover, which often is also held under vacuum. A tear-off, or separate removable band around the finish of a container is often used as a supplementary seal to hold a cover cap in place and to prevent it from accidentally becoming loose. When made an integral part of the primary closure the supplementary seal affords protection against tampering.

Many further variations of the other four main types have been developed for specific products. The packer is sure to find several competing types which are appropriate for his product and package.

Secondary Closures—A secondary closure is one that does not come in contact with the glass-packed product. It may be used: (1) as a dust cover to keep the whole neck of the bottle or jar clean for dispensing purposes, (2) as a cover for whatever part of the product remains in the container after the primary seal is removed, (3) as a decoration to "dress up" the package or (4) to hold the primary seal in place on the glass finish, (5) to prevent tampering.

Among the secondary closures are the so-called cover caps, frequently used to protect the primary closure or pouring edge of a bottle. Many milk bottles have cover caps of paper or (formerly) aluminum foil, and distillers often used a hood of gold or silver foil over the cap to dress up the package. Catsup cover caps made of tinplate are used as covers for partially filled bottles after the primary closure such as a crown or formed cap has been removed. Many secondary closures are made of cellulose cups, either opaque or transparent, sealed over the primary cap on the finish.

In this classification also fall a variety of tamperproof closures, usually metal strips which bind the primary closure and must be destroyed before the bottle can be opened. Here, too, is the cellulose disc applied inside the primary closure, secured by an adhesive to the sealing surface of the bottle.

The virtues of packaging in glass under closures are too well known to require further description. For the proper type of closure and glass finish to specify for a given set of packing conditions, consult the manufacturers of closures and glass containers.

Government limitations

It would be impossible in an article of the present scope to include complete details as to closure limitations imposed by the War Production Board nor would it be practical to reproduce the orders because they are continually being amended. Users and makers of closures should keep informed about these orders and their latest amendments. The various orders have effected conservation by the following methods.

Reducing size of closures
Eliminating smaller packages
Eliminating and/or reducing tin coatings
Eliminating and/or reducing rubber for sealing
Eliminating and/or reducing use of steel
Conservation in use of protective coating materials

Substitute closures—It is not easy to find satisfactory materials from which substitute closures can be made. Here are some of the hazards:

1. Tolerance requirements of glass make a yielding cap and cushioned gasket material necessary.
2. There must be a means for mechanical adherence of the closure, by vacuum, friction, threads, lugs.
3. A closure must hold until it is ready to be removed, then it should come off easily.
4. Closure materials should not be appreciably affected by moisture.
5. The finished closure, if of a screw type, should be able to withstand a torque of 15—40 in.-lb. without break or distortion, and should be removable with about the same amount of force.

The search for substitutes

The perfect closure of the past depended on the three now highly critical materials—metal, plastics and rubber. Except for high priority products, comparatively few items of merchandise are now permitted to use any of these three. As a result, there was a search for substitutes.

The crown cap presents a most puzzling problem. Limitation orders have reduced the allowable quantities of metal for carbonated beverages and brewers, and the user must restrict himself to existing machinery and to

the use of types of closures which can be applied economically on present packaging lines. That stipulation excludes many otherwise excellent suggestions. Tests are still being conducted by brewers and carbonators. The former will have a tougher time than the latter because of the pasteurizing process. This process lasts about 45 min., raises the temperature to approximately 150° F. and increases the pressure to approximately 90 lb.—all of which has played havoc with plastic and fibre caps so far developed.

Better luck has been experienced in developing screw caps of paper, glass, ceramics and available plastics. Even cork and wood—at one time the only known closure materials—are being pulled back into service. Although several concerns report having abandoned projects that at one time looked very good, and others tell of direct war work interfering with closure production, the situation is beginning to look hopeful.

Paper closures that fit over a round edge glass jar have extended their usefulness in connection with quite a few products such as cleansing creams, jellies and processed cheese. These closures are made of bleached sulphite or molded fibre, treated so as to be grease-resistant, and a seal is formed with wax.

Coffee is on the market with several different types of paper caps. One of these is a screw cap with a continuous thread which, it is claimed, goes through the packaging line with no trouble, forms a tight seal on the jar and also has re-use possibilities. Another is a slip cap with a secondary closure of viscose to make a tight seal.

At least one successful paper lug cap is on the market. This is on a wide-mouthed tobacco jar and is made in two different sizes.

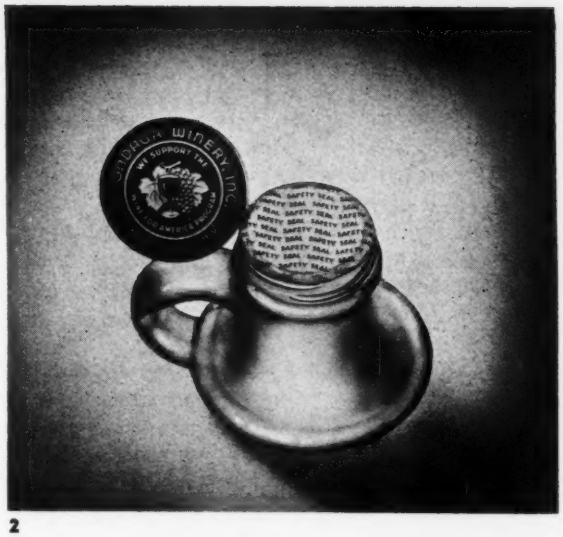
The glass manufacturers are playing around with closures mostly of the lid type, though some report success with screw, shell and lug types. The difficulty here lies in the need for a gasket. So far it seems to be accepted that glass-to-glass cannot form a perfect seal.

Ceramic closures are appearing which may solve the problem for some products. One company reports having successfully made screw caps of ceramic materials in 22-mm.—89-mm. sizes, glazed or unglazed in about 60 different colors. They are suitable for high-priced products, and to that degree may release critical metals and plastics, but the makers of low-priced, low-margin products cannot regard them with much hope.

When plastics are mentioned for packaging, the question should always be asked "which plastic?" The ureas, the phenols and the styrenes are all under restrictions for civilian packaging and the situation regarding their availability is unpredictable at any given moment. Acetate is suitable only for grease-base products. (For additional information, see *Plastic Closures*, p. 589.)

The supply of cork is much less critical than it has been. Probably the biggest user of cork for closures is the hard liquor industry but its consumption has been considerably reduced due to the fact that most of the distillers are devoting their entire capacity, to alcohol production for direct war purposes.

Closures of wood are suitable for some products but most of them require some kind of a secondary seal. There are screw caps and stoppers of wood in existence but a difficulty seems to lie in securing uniform production and sometimes in preventing the "warp."



2

2—*A secondary or supplementary seal closure, resembling a liner. This seal is affixed to the bottle top before the capping operation and serves to prevent tampering. Photo, Ferdinand Gutmann & Co.*

Liners and sealing compounds

The liner manufacturers are suffering from a shortage of manpower; the demand for liners has considerably increased; there, of course, is a scarcity of oils and resins for producing the varnished-paper type of liner; those made from rubber, such as Panaseal and Raolin, are not obtainable. Vinylite has been needed for essential war uses, and only a limited supply has been available for essential closure needs, although some of this material is expected to be available soon. A new lining material produced from Koroseal was introduced in 1943. This material is somewhat similar to Vinylite, being made from vinyl chloride, whereas Vinylite is produced from the copolymer of vinyl acetate and vinyl chloride. The Koroseal material can be used to replace Vinylite, and for all practical liner purposes is equivalent. Liners produced from pure gum rubber or those with natural rubber as a material are no longer available.

Liner materials now available include the following:

Regular yellow varnish paper—Used on food products, such as peanut butter, mayonnaise, prepared mustard, salad dressing, as a spot for crowns, especially for soft drinks and on a variety of pharmaceutical and household products.

Black alkali paper—Primarily developed for milk of magnesia use, although this material finds general acceptance for many pharmaceuticals and certain dry chemicals. Black alkali has been used on liquors, although it is not as good as Vinylite or Panaseal for this type of packaging application.

Pale yellow varnish paper—This paper is generally not quite as resistant as the regular yellow and is used where

the particular customer may, for one reason or another, desire a lighter liner.

Harvel—This special paper has been used for products containing certain types of solvents and has been used also on liquid deodorants and certain shoe polishes.

Whiteseal—Whiteseal currently has been used as a substitute for tin foil in sealing products containing organic solvents. It is not nearly as efficient as tin foil, although it is being used as a substitute for foil at the present time. Whiteseal is likewise being used currently on liquors, face creams, cold creams, and other products, as a substitute for Vinylite or Panaseal.

Of the varnished papers, black alkali paper is probably the most universal of all of the varnished papers and could be used quite generally. Its dark color has been the main reason why it is not used on many more food products; for instance, it could be used satisfactorily on peanut butter and mayonnaise. However, the regular yellow paper is more nearly the color of the product; consequently, it seems to be more acceptable.

Vinyl resin copolymer—Although this material is under restriction it is available for foods and pharmaceutical products in reasonable quantities.

Rubber hydrochloride sheeting—The appearance of this sheeting is quite similar to that of vinyl resin copolymer but in view of the scarcity of rubber, this material is not at present available for closures.

Cellophane—For liners requiring resistance to solvent action, cellophane is widely used for liners where resistance to solvent action is required. Available today for food and health items only.

Nitrate and acetate films—These films have been used in the past but in relatively small quantities. They are continued in use today but are confined sharply by a limitation order.

Plastic wax liners—These liners consist of pulpboard with a heavy coating of plasticized wax and have been widely used in the past on food containers. From present indications their use is still possible in all quantities.

Newly developed papers include lacquered glassines and papers coated with solutions of urea formaldehyde and various resins. These papers have their uses where normal oil papers would be soluble. They are available in limited quantities.

Glass-fibre liners—Limited quantities of glass-fibre liners have been used but these are not now available except under special circumstances. Generally speaking, there is high priority on them and they may be used only for sealing of concentrated chemicals, such as acids and similar concentrated chemicals.

Structure of liners

Liners may be divided into two classes; namely, simple and duplexed. By simple liners is meant a liner of a single material, treated or untreated. A duplexed liner consists of a backing faced with a material which is resistant to the product, the backing being used to support the facing and to take up the space between the sealing lip of the container and the closure so that a tight seal is made. The facing is generally adhered to the backing.

Simple Liners	
Pulpboard	White felt
White waxed paper	Waxed saturated pulp
Saturated pulp	Plastic wax
Natural cork	Rubber(various types)
Cork composition (various types)	Special solvent (various types)

Duplexed Liners	
BACKINGS	FACINGS
Newsboard	Waxed paper
Pulpboard	Varnished paper (various types, Silite, etc.)
Cork composition	Vinylite
White felt	Panaseal or Raolin
Tan felt	Metallic foils—tins
Gray felt	Aluminum and lead

Plain pulpboard and white felt can be used for retaining products which are dry and non-hygroscopic. For powders, pills or capsules, which are only mildly hygroscopic, a white waxed paper, saturated pulp or waxed saturated pulp is indicated. Cork composition (either plain or waxed) will protect hygroscopic products, and finds quite general use in closures throughout the narrow-mouth package field.

Rubber or else rubber substitute liners are quite generally used for alkaline products, such as household ammonia, the hypochlorites, mild acids, tincture of iodine and cuticle remover. A pure gum rubber (minimum amount of free sulphur) is generally supplied for solutions to be used for injection purposes.

In addition, special liners have been developed which are resistant to solvents. They may be used in caps with posts or wells where a washer-type liner is indicated and also on corn cures, nail polish, solvent adhesives.

Duplexed liners consisting of a backing and a facing are the liners which appear to be most generally used for closure purposes.

The most common backings consist of pulpboard, newsboard or cork composition. In metal caps, double insertion is often used in which the backing and facing are not combined, but the superimposed materials are punched directly into the caps. In molded caps it is customary to adhere the facing to the backing with a tasteless and odorless adhesive.

Several different grades of cork composition can be supplied. Cork particles may be either large or small in size range and different degrees of resiliency may be produced according to the variation in densities in the different compositions.

As a guide for the study of available liners which might be used, the accompanying table will indicate a possible selection. Liners formerly used are indicated by the letter "F." However, it should be remembered that each product should be subjected to proper laboratory tests before a substitute liner is used.

There is really only one good way to determine whether a liner will work and that is to conduct actual tests. The products which are official in the *British Pharmacopoeia* or in the *United States Pharmacopoeia* and

National Formulary could be studied in the laboratory, and a definite liner recommendation made, providing some one cared to take the time and spend the money to do this.

It would be impossible to make a general recommendation for the non-standard or unofficial products. Likewise, it would be foolhardy to attempt to make a general recommendation for liquid glues. Some of them are alkaline in their nature, some of them natural, others acid, and since glue is a general term for adhesives, the solvent type of adhesive, such as cellulose nitrate, might be classed under the same category. The cellulose nitrate types, being a solvent solution, require a metallic foil as a liner (currently Whiteseal as a substitute), while the acid animal glues would definitely corrode the tin foil. Here Vinylite, or possibly black alkali paper (if the acid is not too strong), might be used.

It is general practice to conduct accelerated tests on the various lining materials. These consist in using a 1-oz. bottle with 28-mm. finish. Caps are lined with the test materials. About ½ ounce of the material under test is introduced into the bottle and the cap is applied with a standard tightening force of 33 lb. tangential pull or 17.9 torque inch-pounds. Duplicate sets are put up and are then subjected to elevated temperatures, one bottle in upright position and the other in inverted position. A temperature of 150° F. is used for the products which are not volatile. The volatile solvents are held at 120° F. both in upright and inverted positions. After an exposure of 48 hr., the samples are removed from the oven and permitted to come to room temperature, after which they are visually examined to note what action has taken place and the liner is then scratched with the fingernail to determine whether the facing has been softened or not. Moisture transmission tests are always conducted in the regular standard manner.

Other characteristics of the papers, such as resistance to blend, brittleness, uniformity of coating, of course, must be evaluated. The paper must have the ability to be properly attached to a backing material, such as pulpboard or newsboard or to cork composition with the various types of adhesives commonly used.

TABLE I.—SUGGESTIONS FOR LINERS OR FACINGS

	Varnished paper	*Tin foil*	*Silite white seal impervite*	*Vinylite*	*Panaseal Raolin*	*Waxed paper*	*Rubber or substitute*	*Special*
Dry Powders	XF	..	X	F	F	XF	..	..
Mineral Acids:								
Concentrated	..	..	..	..	..	..	..	XF
Weak	..	..	..	?F	?F	..	..	..
Alkalies:								
Concentrated	..	..	..	..	..	..	X	..
Weak	..	..	..	?F	?F	..	X	..
Solid	..	..	..	?	?F	?	..	..
Alcohol:								
U. S. P.	X?	F	..	XF	F	..	..	..
Denatured	X?	F	X	XF	F	..	..	..
Bleaching Solution	..	..	..	XF	F	..	X	..
Adhesives:								
Liquid	X?	..	..	F	F	..	..	X
Solvent Type	..	F	X	..	..	..	..	..
Cosmetic Creams	X	..	..	F	F	?	..	..
Corn Cure	..	..	..	..	..	..	..	X
Foods:								
Dry	X	..	X	F	F	X	..	..
Olive	X	..	..	F	F	..	F	..
Relish	X	..	..	F	F	..	F	..
Mayonnaise	X	..	..	F	F	..	F	..
Processed	..	..	..	..	..	..	X	..
Liquor	X	F	?	F	F	..	..	..
Nail Polish	..	F	X	..	..	..	..	X
Nail Polish Remover	..	F	X	..	..	..	..	X
Oils:								
Animal	X	F	X	F	F	..	..	..
Mineral	X	F	X	F	F	..	..	..
Vegetable	X	F	X	F	F	..	..	..
Essential	..	F	X	..	..	..	..	X
Organic Solvents	..	F	X	..	..	..	..	X
Perfume and Toilet Water	?	F	X	..	..	..	..	..
Pharmaceuticals	?	?F	?	?F	F	..	..	..
Wine	X	..	..	F	F	..	?F	..

F—Formerly used.
X—Facing can be used with these products.
?—Liner probably can be used.

PICTORIAL REVIEW



1. 45-mm. continuous-thread closure, full dome, no knurl, wire edge.

2. G deep screw closure, flat top with sealing bead, knurling, interrupted thread, wire edge.

3–4. 28-mm. and 45-mm. continuous-thread closures, flat top with sealing bead, knurling, wire edge.

5. G 2-piece deep screw closure, gasket-lined disc (lithographed for sale as a home-canning closure).

6. 60-mm. continuous-thread closure, flat top, no knurl, turned-in wire edge.

7–8. Continuous-thread closures with indentations to permit venting of internal pressure.

9. G deep screw closure, flat top with sealing bead, knurling, wire edge.

10. One-piece straight-side closure with continuous thread in turned-in skirt ("Unishell").

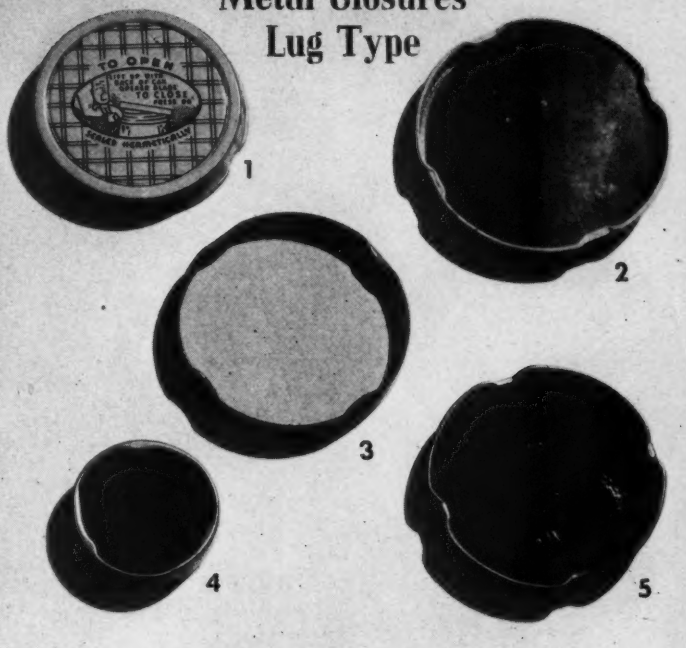
11. 63-mm. continuous-thread closure, flat top with sealing bead, knurling, wire edge.

12. Semi-double shell continuous-thread closure (shell with threaded band in skirt).

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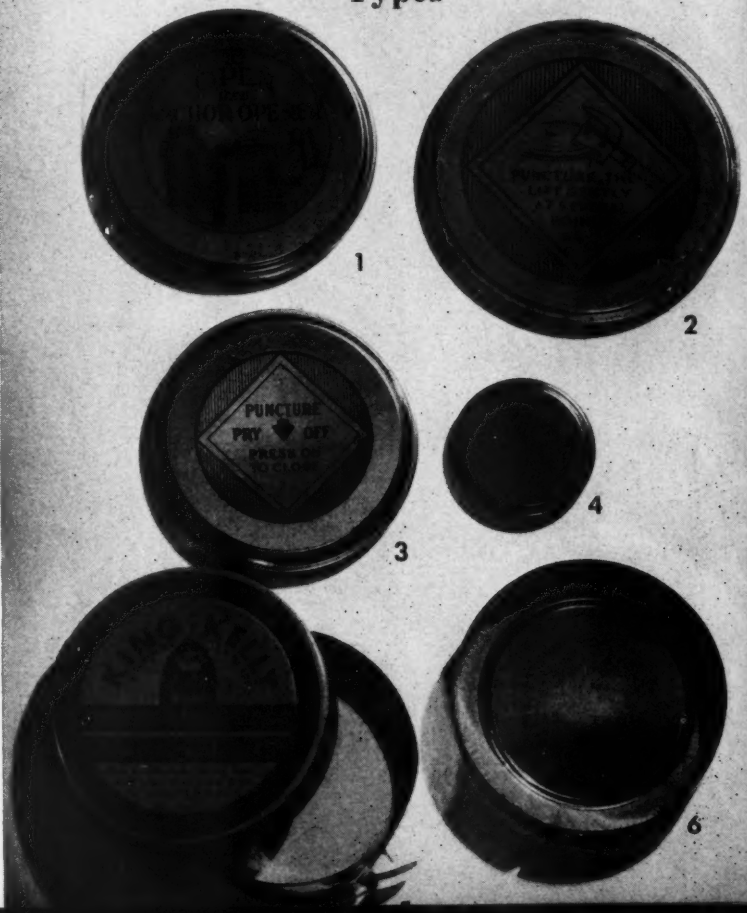
W OF CLOSURES

Metal Closures Lug Type



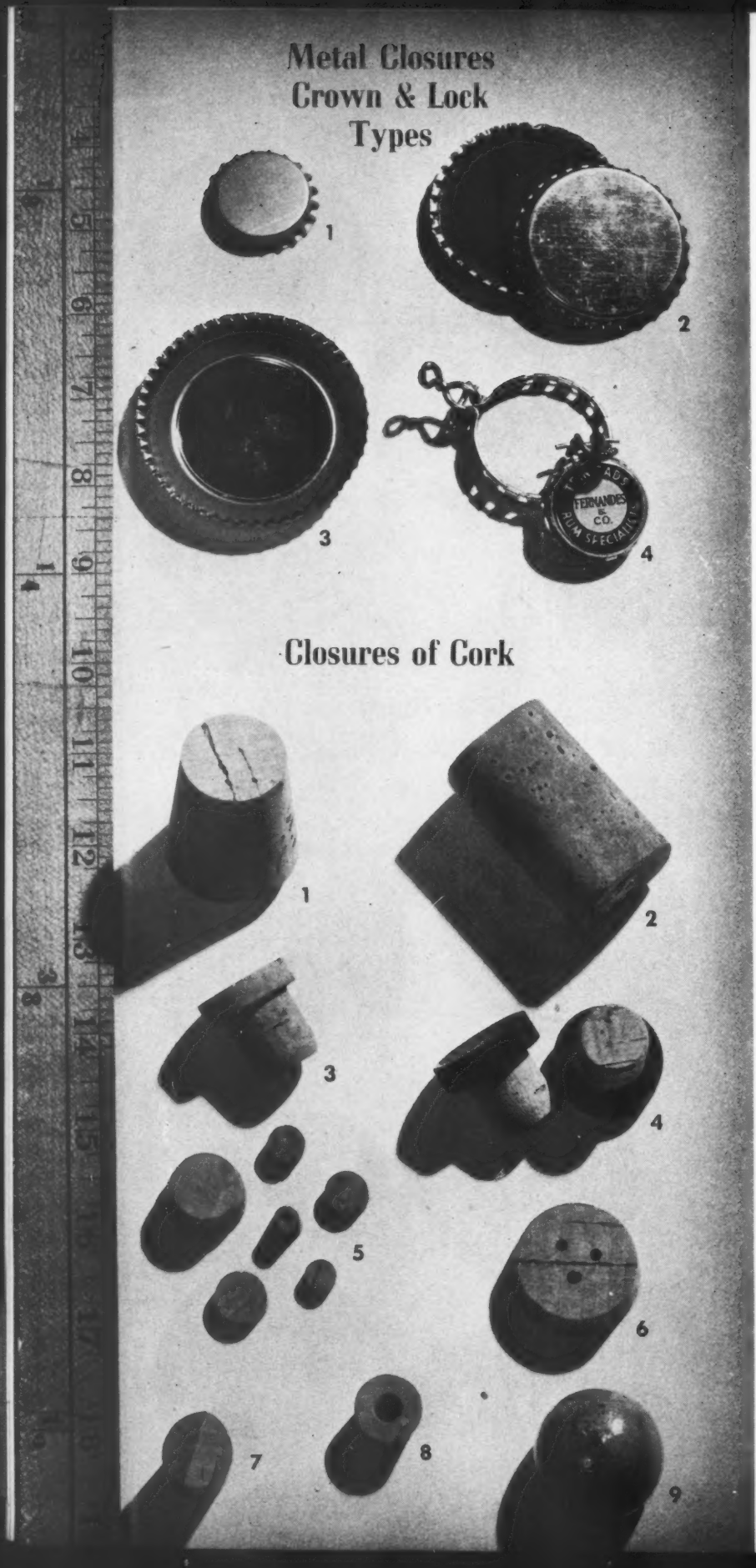
1. Closure with lug indentations which form vacuum pry-off finish, effecting water-tight re-seal.
2. Lug closure, flat top with sealing bead, knurling, wire edge (closure inverted to show waxed oil paper liner).
3. Lug closure, flat top, straight side, turned-in edge (inverted to show pulp and vinyl resin liner).
4. Lug closure, flat top, straight side, turned-in edge (inverted to show pulp and oil paper liner).
5. Lug closure, flat top with sealing bead, knurling, wire edge (inverted to show cut rubber or composition sealing gasket).

Metal Closures Vacuum & Band Types



1. Side-seal closure for jars and tumblers.
2. Side-seal closure for thin blown or light pressed tumblers.
3. Side-seal closure, pressed-on type for jars.
4. Side-seal closure for lubricating oil containers.
5. Band closure consisting of disc and tab-locked band (one closure inverted to show interior and band lock).
6. Band closure (inverted to show flowed-in sealing compound in disc).

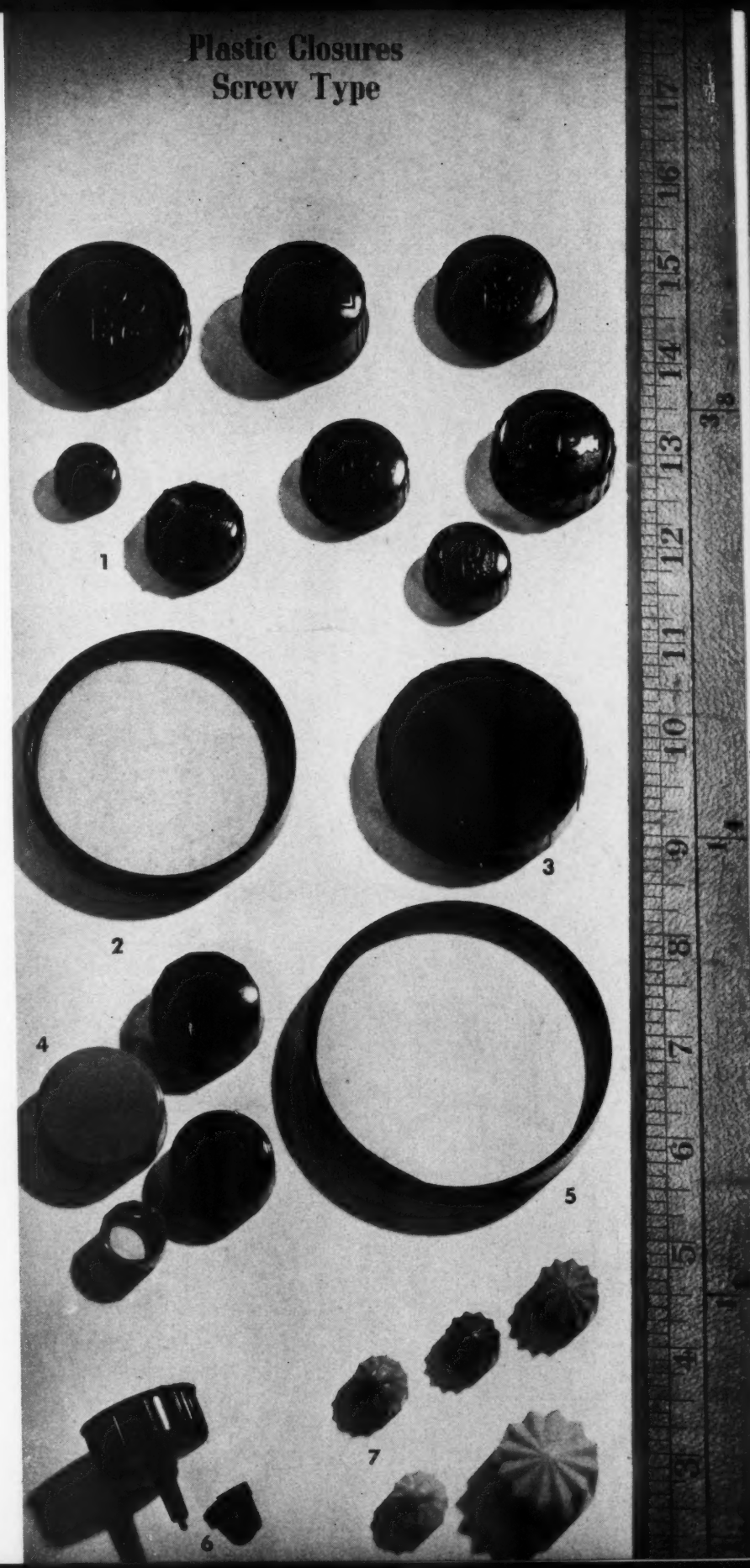
(Page 537)



1. Crown cap (used extensively for non-alcoholic and malt beverages).
2. Crown caps (large sizes for bottles and jars).
3. Crown cap with deep skirt and flowed-in sealing gasket.
4. Lever-lock closures (lifting lever permits hand removal of closure).

1. Tapered cork in general use for bottles, jugs, flasks, etc., made in a wide range of grades, tapers and sizes.
2. Champagne cork, over-size, driven into bottle under compression, making it assume cylindrical shape.
3. Cork flange-top closure, shape facilitates removal; used on whisky and products requiring tamperproof outer seals.
4. Cork closures with flange top, synthetic substitute for embossed wood or plastic top closure, for wine and whisky packages.
5. Group of small cork closures for vials, ampuls, etc.
6. Closure for laboratory use with apertures for pouring tubes, etc.
7. Wedge-top cork (ordinary tapered cork with formed top). Widely used for perfumes and cosmetics.
8. Cork with aperture for sprinkler or dispensing top.
9. Cork-knob top for cork closure.

(Page 538)



1. Plastic continuous-thread closures (group illustrates assorted sizes with trademark designs).

2. 63-mm. plastic continuous-thread closure, plain, round (inverted to show waxed vinyl resin liner).

3. 48-mm. plastic continuous-thread closure, stock design (Lustrseal).

4. Plastic continuous-thread closures (stock designs in many colors and sizes).

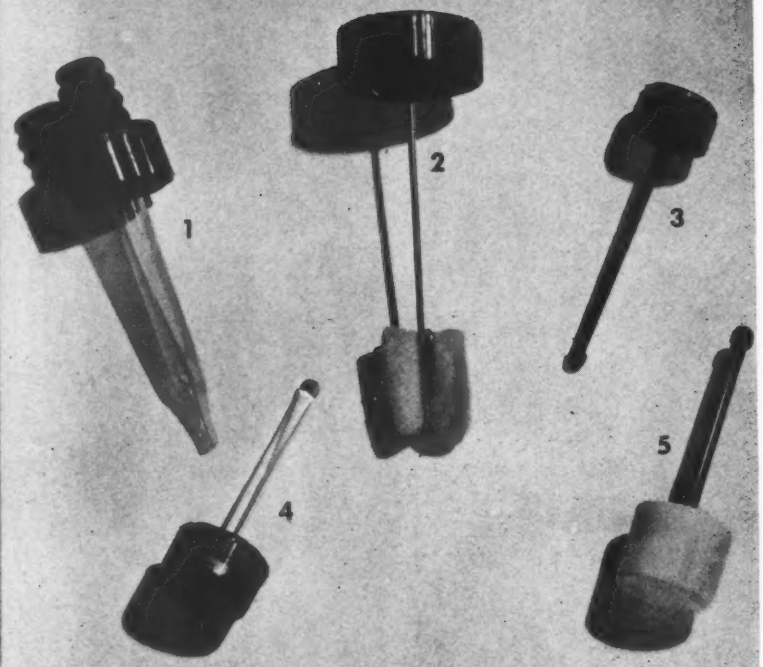
5. 70-mm. plastic continuous-thread closure, plain, round (inverted to show pulp and vinyl resin liner).

6. Plastic closure with dispensing spout and miniature closure for sealing spout (used on lighter fluids).

7. Plastic continuous-thread closures, stock design ("Tassel").

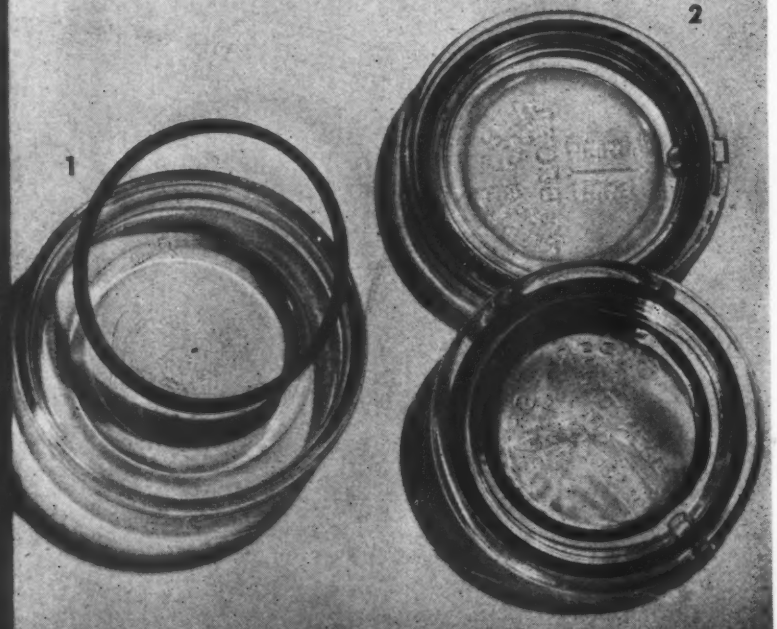
(Page 539)

Plastic Closures
Applicator Type



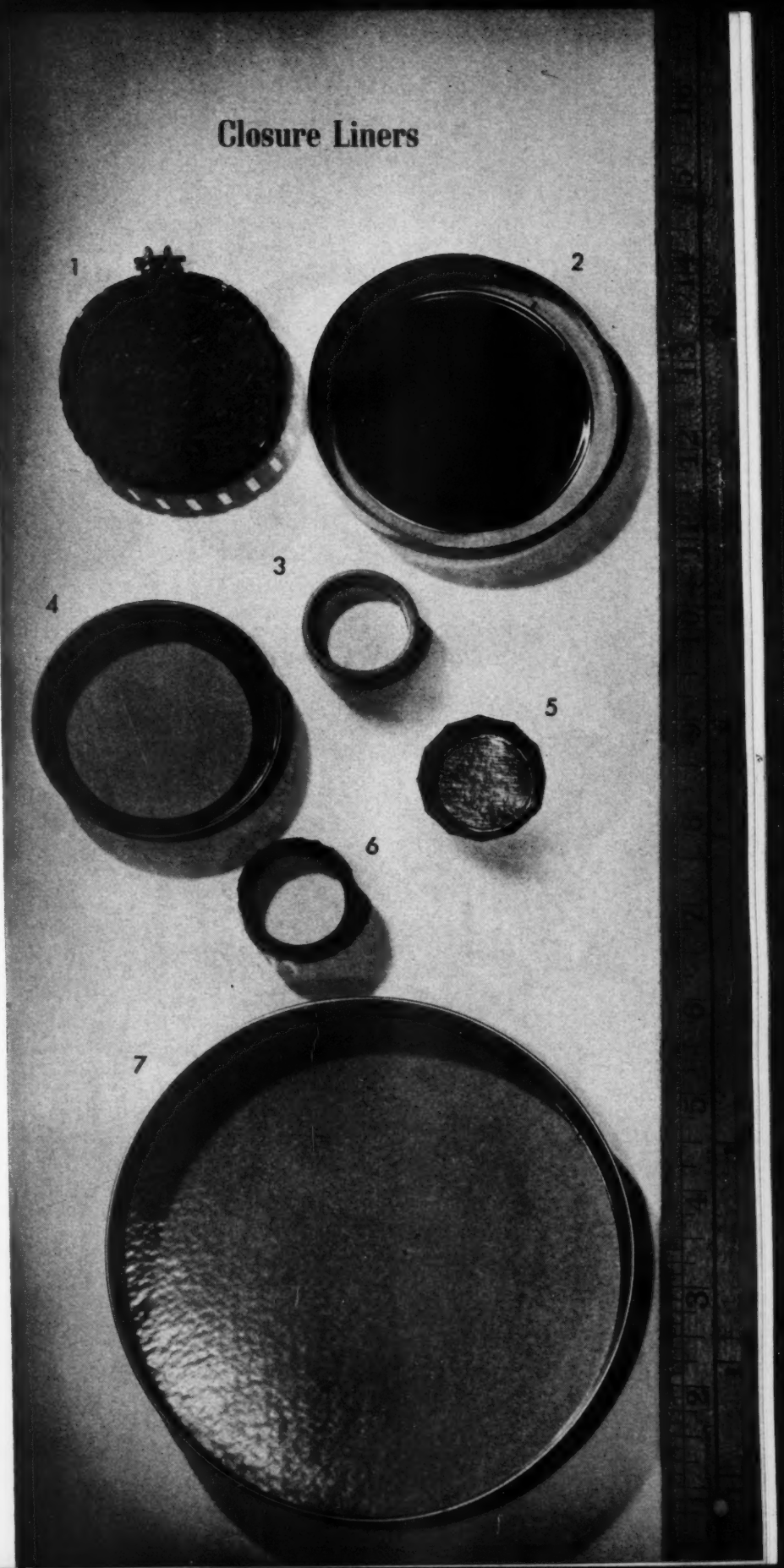
1. Plastic continuous-thread closure fitted with glass dropper and rubber bulb.
2. 28-mm. plastic continuous-thread closure fitted with wire edge and wool dauber.
3. Plastic continuous-thread closure fitted with plastic applicator.
4. Plastic continuous-thread closure fitted with glass applicator.
5. Plastic continuous-thread closure fitted with plastic applicator.

Glass Closures



1. Glass closure, pry-off type, showing cut rubber or composition sealing gasket.
2. Glass closure, vacuum type. Slot at edge permits piercing cut rubber or composition sealing gasket to break the vacuum.

(Page 540)



1. Lever-lock closure with composition cork liner.

2. Band closure with flowed-in sealing compound in disc.

3. Wood continuous thread closure with pulp and vinyl resin liner.

4. Metal continuous thread closure with slip-type rubber or composition sealing gasket.

5. Plastic continuous thread closure with metal foil liner.

6. Plastic continuous thread closure with pulp and vinyl resin liner.

7. Metal continuous thread closure with pulp and vinyl resin liner.

(Page 541)

Wood & Ceramic Closures



1. Continuous thread closures made of various kinds of wood, stained and natural color.

2. Ceramic closures, continuous thread, available in many colors. Threads treated to avoid gritty abrasion on container.

Secondary Closures



1. Secondary closure of paper used with metal closure adheres to container finish to prevent tampering with contents ("Safety-Seal").

2. Container for medical products with secondary closure supplementing the rubber cap, to ensure gas-tightness.

3. Secondary closure for liquid food container ("Sylph-Seal").

4. Liquor bottle with tamper-proof secondary closure ("Cel-O-Seal").

5. Coffee jar with secondary closure ("Cel-O-Seal") to effect gas-tightness.

(Page 542)

Pottery containers

Highly attractive because of the intrinsic charm of the material, the variety of novel or standard shapes in which it can be molded, and the range of decoration with which it may be embellished, the pottery container has long been associated with luxury items, and many of 1945's ceramic packages will be in that class. In relatively few cases have the excellent utilitarian properties of pottery packages been emphasized. Recently, however, new wartime applications of pottery have furnished some good examples which may tend in the near future to take pottery out of the luxury class and increase its use in American industry.

First let us look at the utilitarian role. Consideration should be given to the huge pottery jars in which chemical plants are now packing such commercial items as mercury, iodine, bismuth, subiodide and the like. Here the jumbo-size jugs carry a burden dropped by war-requisitioned metal containers. Both for shipping and local storage, the stone crocks have been found to be doing a good job.

Another large user, a war baby as it were, is the U. S. Navy which has ordered vast quantities of bean pots—probably not so much for transportation from central galleys as for serving pots.

One of the principal reasons why the clay container has not been more generally used for war purposes is the difficulty of obtaining a satisfactory closure which will not involve the use of critical materials. The most satisfactory closure is one which requires a metal clamp and a ring of rubber for perfect sealing. Neither material, obviously, can be used extensively for usual civilian requirements.

Ordinary clay covers or lids have a tendency to ride away from the container, and while cellulose sealing rings may serve to take the container from the packer's factory to the consumer's kitchen, the problem of preserving partially emptied containers is one that has not been satisfactorily solved.

Chief uses of pottery

Use of the container made of the crust of Mother Earth, therefore, continues along the customary lines—for cheeses, for decorative purposes to carry perfumes and for some liquors where natural cork is still available for closure, or where the after-opening seal is not too important.

Probably one of man's first steps in the direction of civilization was the development of his skill in the use and design of clay containers. Historians today place a great deal of faith in their ability to trace long-forgotten peoples by the clay pottery remnants they have left behind. With the growth of skill and discovery of new compounds, better types and grades of pottery came into being—but there is still a strong family resemblance between the beautiful symmetrical demijohn filled with scented bath salts and the crude, sun-baked vessel from which the neo-something warrior drank his goat's milk. Some of this family resemblance is studied and deliberate, to be sure; all of it is artistic, and pottery, as always, remains an attractive means of packaging food and beverage and toiletry.

This consideration, plus the "premium value" of a pottery container for re-use, has kept it in the top ranks of the luxury items. Pottery containers have been a "natural" for gift packages—for here the contents are often less important than the container, and the ultimate traffic will bear the additional cost of shipping and production, and the breakage mortality. The quaint-appear-

1—Decorated with 23-karat gold, containers for King's Men toiletries demonstrate use of ceramics for luxury lines. Photo, Ceramic Decorators.

1



2—Design possibilities of unadorned ceramic are demonstrated by Sportsman shaving bowl with self decoration. Photo, John Hudson Moore, Inc.

2



ing earthenware jar is an acceptable gift whether it be presented empty or filled with cheese, liquor or perfumes.

Pottery in wartime

From the practical standpoint, earthenware has been commercially used for many years to package condiments, spices, bulk butter and cottage cheese. Most of us remember the vinegar and wine jug (and the brown jug Uncle George took with him at haying time), and to some extent these uses are coming back. Nevertheless, pottery to date,

3—The re-use value of pottery packages, such as the perfume bottles and mug illustrated here, is a good selling point. Photo, House of Harwick. 4—This tidy ceramic container for bubble bath will harmonize with almost any scheme of bathroom decoration. Photo, Jean Nate, Inc. 5—Spirit and color may keynote pottery decoration, as in the case of containers for the Old Spice men's toiletries line. Photo, Shulton, Inc.

3



4



5



does not promise to take up much of the tin can's former burden.

Coloring of the pottery product has become increasingly difficult since the war's opening guns. Blues and reds are particularly difficult to obtain, though greens, brown, ivory and whites are still available. Black is out.

Wide use of clay products for many non-container uses—such as dipping baskets for plating of metals, as dishes for steam-tables and the like—is another factor which serves to keep makers from giving too much attention to civilian packaging needs; deliveries at best are far behind schedule if at all considered.

Strictly speaking, "pottery" springs from the French *poterie* and includes all objects made of clay. Earthenware and stoneware are interchangeably used for various processed forms of pottery, while porcelain is, properly, applied only to certain definitely designed varieties of pottery which are obtained in a special way. Porcelain, rightly, covers only products having a translucent quality. Porcelain originated in China and came thence to Europe where alchemists tried to duplicate the effect but failed because they tried to mix glass with clay. The Greek word *keramos*, meaning potter's clay, gave us the word "ceramics," generic term for the entire field.

Color in pottery depends upon the locality from which the clay is obtained, the composition of the body, and the method of firing. The amount of iron, for example, is important in giving color to the product. Because good clays are found in most parts of the United States, homemade pottery is as good as any made anywhere. Lacquers and varnishes add to the possibilities of decorative treatment as well as the firing conditions. While the Chinese used cobalt to give color to their clay products—being one substance they knew that could stand the high temperatures—modern chemistry found others.

High-temperature firing is vital if pottery is to have the vitreous protection required by certain contents and that is a point that must be considered when selecting pottery containers—absolutely moistureproofed containers must be had only in limited colors, for certain hues will not stand the high temperatures that their more drab cousins take with greatest of ease. Unglazed pottery is highly porous and has a tendency to sweat—which is a reason that they are often preferred for cheese products; cheeses age better in pottery. It must be remembered that additional colors in a pottery container mean additional firing and thus increase final cost of the pottery package.

Self-material lids, cork, wood and plastics are generally used for closures, and in nearly every case they require an additional device such as a clamp, an adhesive strip, sealing wax or similar material to keep them in place. While attractive, many of these are not permanent so that the artistic appeal of the pottery container remains the chief characteristic that gives it the preference over others. It is this quality of eye appeal, however, which does such a good sales job that extra cost can be discounted.

Packaging problems can, however, be safely placed in the hands of most of the pottery makers with assurance that they will come up with an adequate suggestion and a practical design for marketing.

Merchandising the glass package

by J. H. Gilluley

Whether it be custom-made or standardized, the glass container is primarily a sales container, and no detail which will take the fullest advantage of its sales appeal should be overlooked by the packager.

A substantial class of glass container depends for its merchandising pulling power on the moldable characteristic of glass. It is a characteristic which has decisive advantages for the packaging of certain products, even though its full employment may put the container into the classification of "special molds," thereby adding to its cost. In this classification fall the dispensing bottles, the process bottles and others specially designed for the use of the product.

The dispensing bottle is usually designed for an applicator cap, the most familiar types being liquid shoe polish, iodine and drawing ink bottles. Process bottles are those designed to facilitate a unique process required by the product; for example, chemicals which must be applied in a certain order are put into plainly labeled glass containers and packaged conveniently together. A typical example is the package of liquid ink eradicator which everyone has used; in this and in similar cases, the type of package designed for the product has virtually made the product possible.

Other bottles and jars are specially shaped for convenience in use. Ink bottles, for example, are designed to make the last drop of ink available or to simplify the filling of fountain pens. The rock-and-rye bottle is another which is designed for a particular purpose peculiar to the product.

Glass design, as an aid in merchandising, has been made functional when it is to be used for such products. The shape of the container is an integral part of the merchandising plan. Glass, being an adaptable material, has thus been given a secondary function scarcely less important than its primary function of packaging. The moldability of glass is a characteristic which can in many cases be made to solve a rather perplexing problem in merchandising.

On the other hand, a reliance upon special glass container molds for merchandising a product is frequently misplaced. The theory is that a package of unusual shape may become so identified with a specific item that it has positive advertising value. There is something to be said for this view. The hexagonal green glass container of a few years ago was identified with prune juice. There is some pre-exhilaration in the shape of the whiskey flask, and consumers would feel that one of nature's unwritten laws was violated if it contained, say, vinegar. But the individual brand names which are identified with particular bottle shapes are few and far between and supported by vast advertising. Heinz ketchup bottles, Hellman's mayonnaise jars and Gulden's mustard jars are the few that are called to mind.

Standardized glass

Too often individuality results in glass container shapes that are merely odd and often freakish. They are of doubtful aid in merchandising. Outside of the perfume and liqueur industries which operate on a logic which passeth ordinary understanding, there is no reason for a glass container to assume the shape of an hour-glass, a heart, a fruit, crown or any other figment of the designer's fancy.

If the packer examines his costs closely, he will doubtless find that the slower speeds of unusual or freak glass containers on his filling lines are not compensated for by increased sales. *Almost invariably, the bottle or jar of the*

1—The position of the labels on the distinctive Higgins ink bottles makes them stand out prominently among other merchandise on shelves.

1



2—Most special private molds such as these went out with the war, but, because of their advertising value, many of them will probably return.

2



simplest design is the one best suited mechanically for high-speed production lines.

Almost always the standardized glass containers are obtainable from most of the glass manufacturers. These have been evolved through the common experience of many companies, and embody the best design principles from the point of view of both the manufacturer and the packer. In the postwar period, it is probable that these standardized designs will predominate in the glass packaging field.

The wartime experience of packers with the standardized containers required by WPB has been broad enough and extensive enough to clear up one or two misconceptions about standard designs. For instance, it has been found that the standards now available offer a considerable range of possibilities. The packer has a choice, not unlimited but certainly reasonable, among a considerable variety of designs, capacities and types of finish. Moreover the packer has learned that there are a good many ways to individualize his standard container. The classic example of what may be done by ingenious package treatment is the beer bottle. No one confuses a Pabst and a Schlitz package, although the bottles are from the same molds.

3—The glass package lends itself to advertising presentation of products in use. For convenience, the package goes to the table. 4—The label gives brand identification to standardized containers which may be stacked in attractive displays. Photos, Owens-Illinois Glass Co.

3



4



Given a standard glass container, the packer has three elements to work with to make his glass package more attractive or more salable. In the first place, he has the shipping carton, which itself may, in some instances, be made a sales-making ally. One Del Monte campaign, for example, included instructions to the grocer on how to make use of the shipping carton in floor displays of the self-help type. Other packers, developing the same idea along different lines, have devised other ways to make the shipping carton serve a double purpose as a merchandising unit. In normal times when paper is less scarce, more may be done, epecially in glass-packed food lines, to utilize the shipping carton much more extensively for display purposes.

In the second place, the glass packager has a considerable field in which to exercise originality in choice and treatment of the closure. The type and nature of the product dictate, to some degree, the type and nature of the closure. Beyond these requirements, the merchandiser is free to develop the closure so that it will be an attractive part of the completed package. An arresting contrast in color, the utilization of the closure top for an advertising message, the treatment of the closure to add to the convenience of the consumer—the possibilities here for diversified and sales-building effects are manifold. A conference with your closure supplier will shed new light on the opportunities in this direction—opportunities which will in all probability be greatly extended after the war.

In the third place, labeling which is not only correct but distinctive is a sure means of making your standard glass container a sales-getter. A glass package with an attractive product is already half-labeled; the problem is to complete the job in as satisfactory a manner as it has been started.

After all of the completely mechanical requirements have been satisfied, color, shape and design of the label may with judicious care be made to assist the product to sell itself. If a particularly dressy package is desired, secondary or neck labels may be added, a decorative feature fully exploited in the liquor field.

In general, the most successful glass package is the one which avoids useless distortions of shape and needless employment of glass. Except in cases where a functional reason can be found for adopting special designs, the ends of merchandising are best served by adhering to the simple, tested standard shapes and making them as distinctive as possible.

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Shown here are four important classifications of products which CEL-O-SEAL bands are now safeguarding . . . foods, drugs, wines and spirits. These attractive bands form a positive seal around the closure. They guard against evaporation, leakage and contamination . . . forestall sampling and substitution.

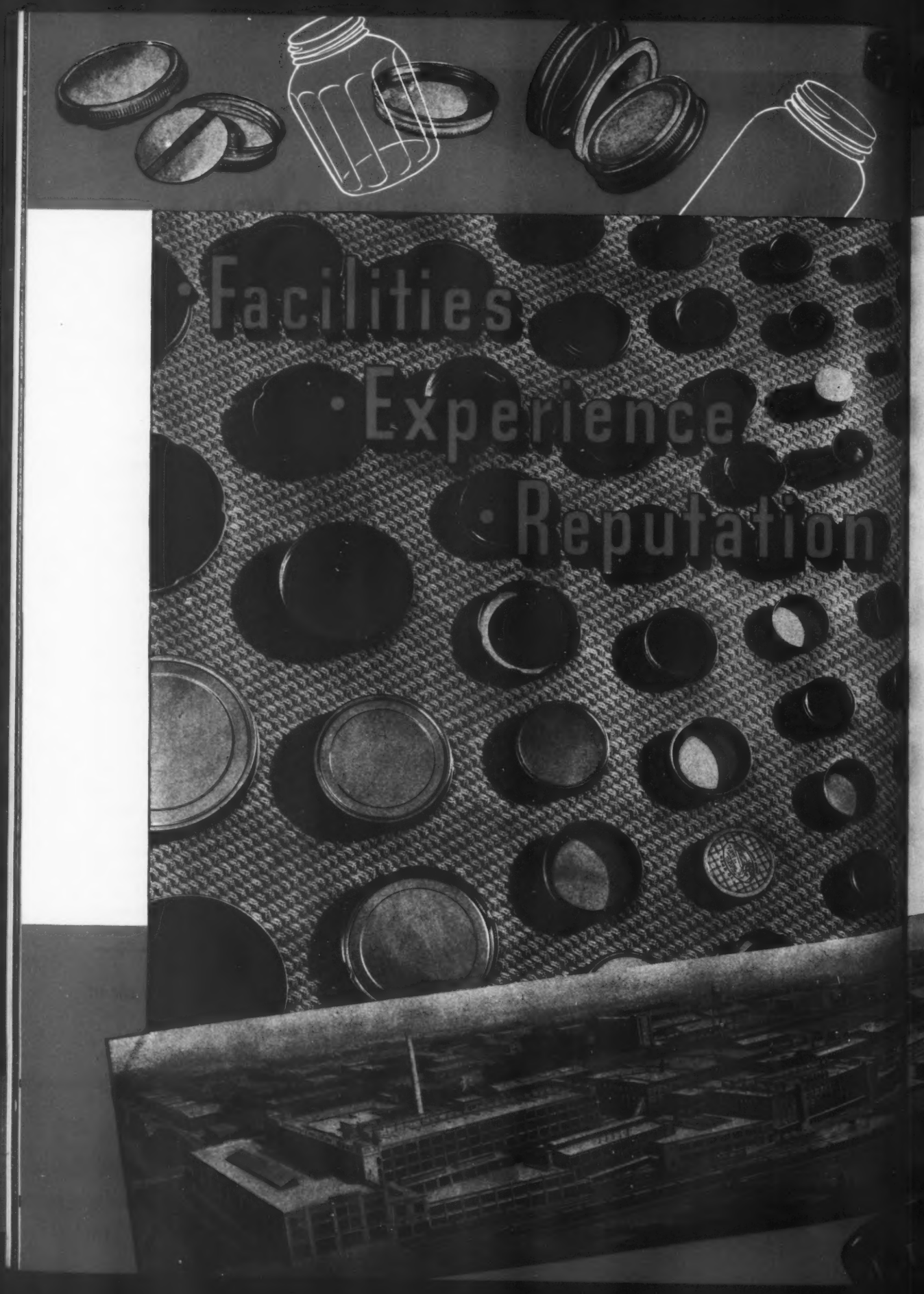
For products requiring government tax stamps, there is a special type of CEL-O-SEAL band. It is the WIND-O-BAND* seal, which has transparent "windows" to permit a clear view of the stamp. The seal holds the stamp firmly in place even after the bottle is opened.

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Armstrong Cork Company, Glass and Closure Division, Lancaster, Pa.
I. F. Schnier Company, 683 Bryant Street, San Francisco 7, Calif.

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Crown's facilities, experience and reputation have made this company "sealing headquarters" for many of the foremost packers of food, drug, cosmetic and household products.

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Closure Division

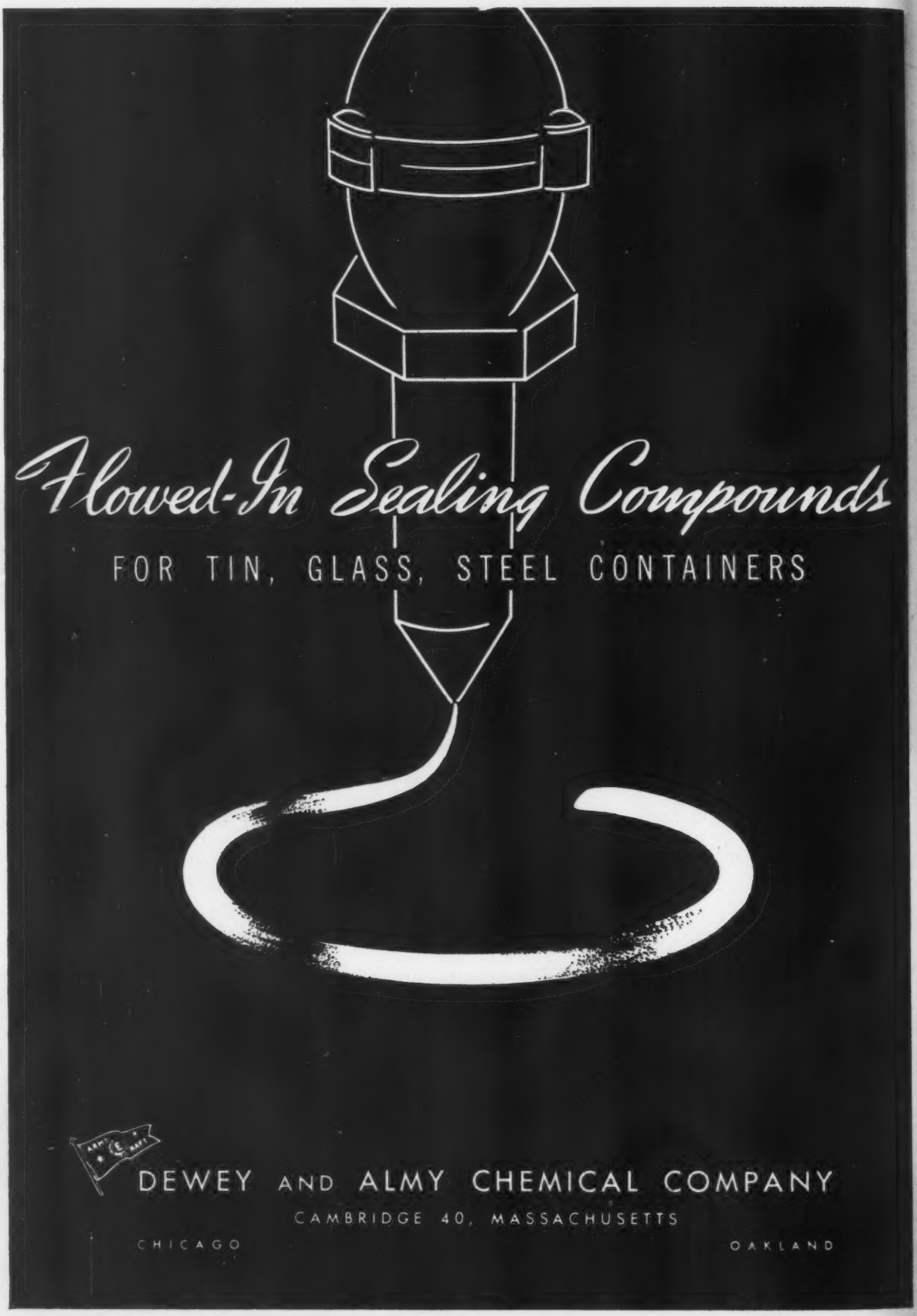
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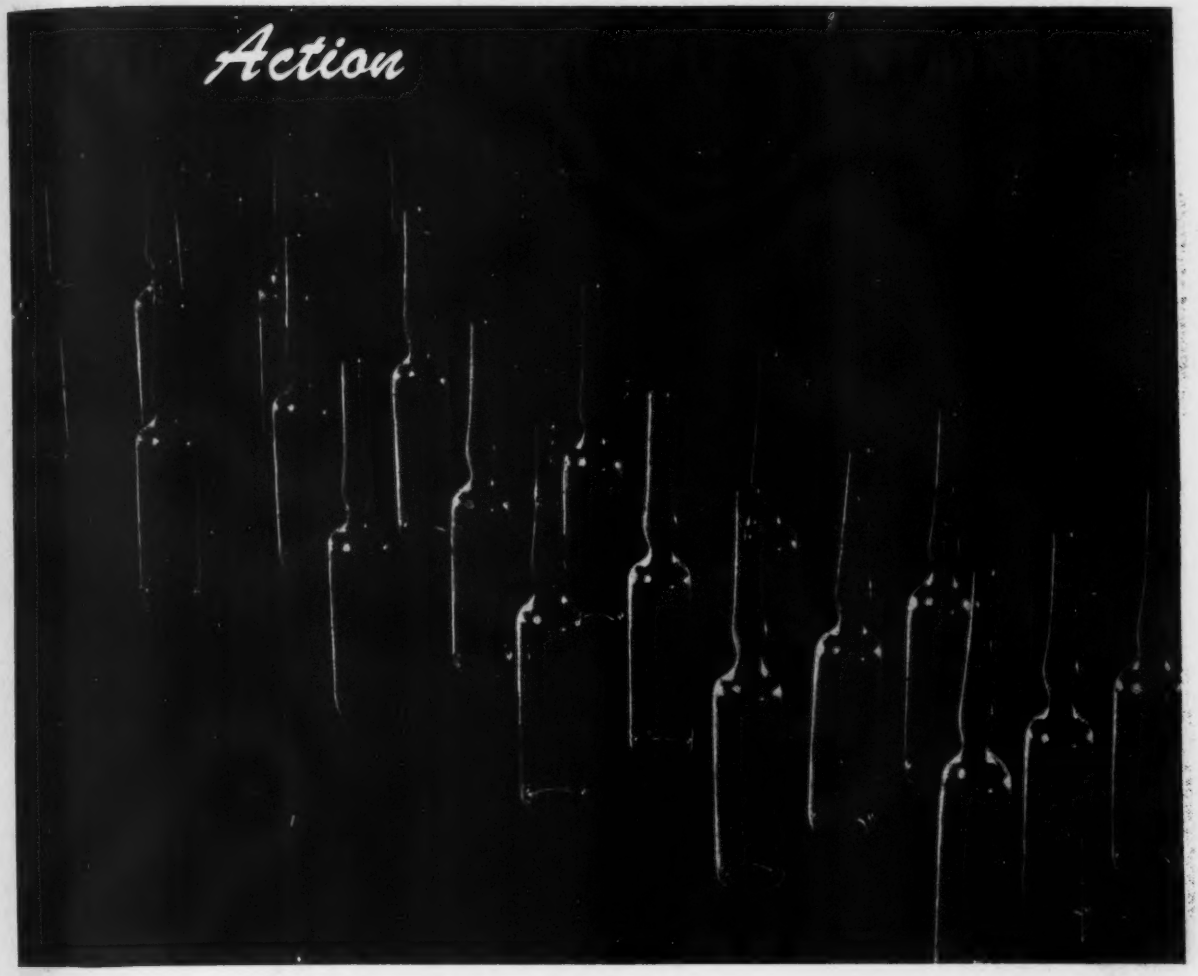
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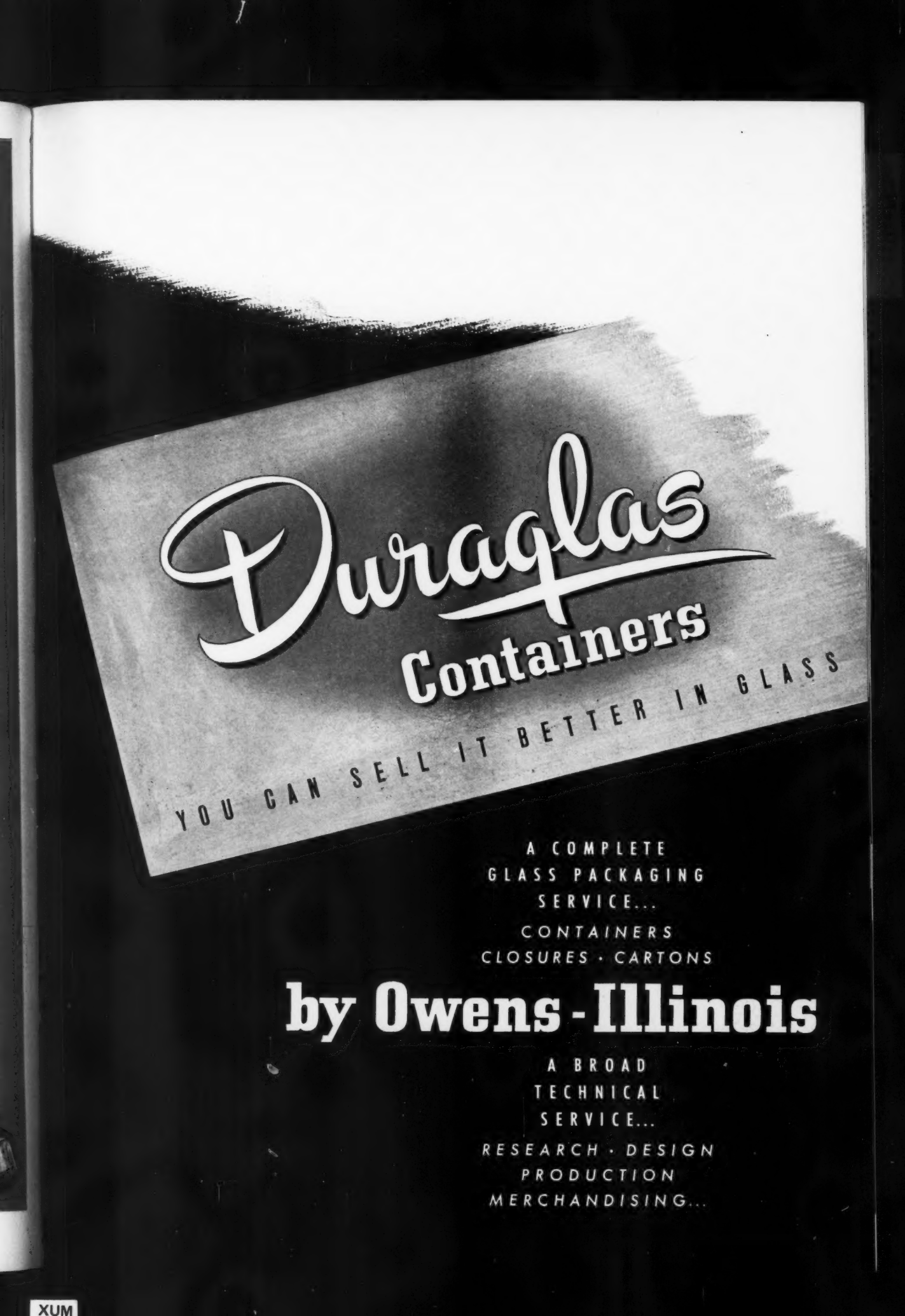
These Kimble Ampuls of Neutraglas are on their way to the fighting fronts and to the home front, to carry life-protecting products where they are most needed. Ampuls are but one of the many types of essential Kimble Glass Containers.

Critical drugs and pharmaceuticals... life-saving and pain-relieving materials . . . could never be effective without the glass containers that carry them to the point of action.

KIMBLE *Glass* CONTAINERS *For Assurance*

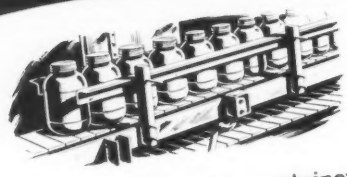
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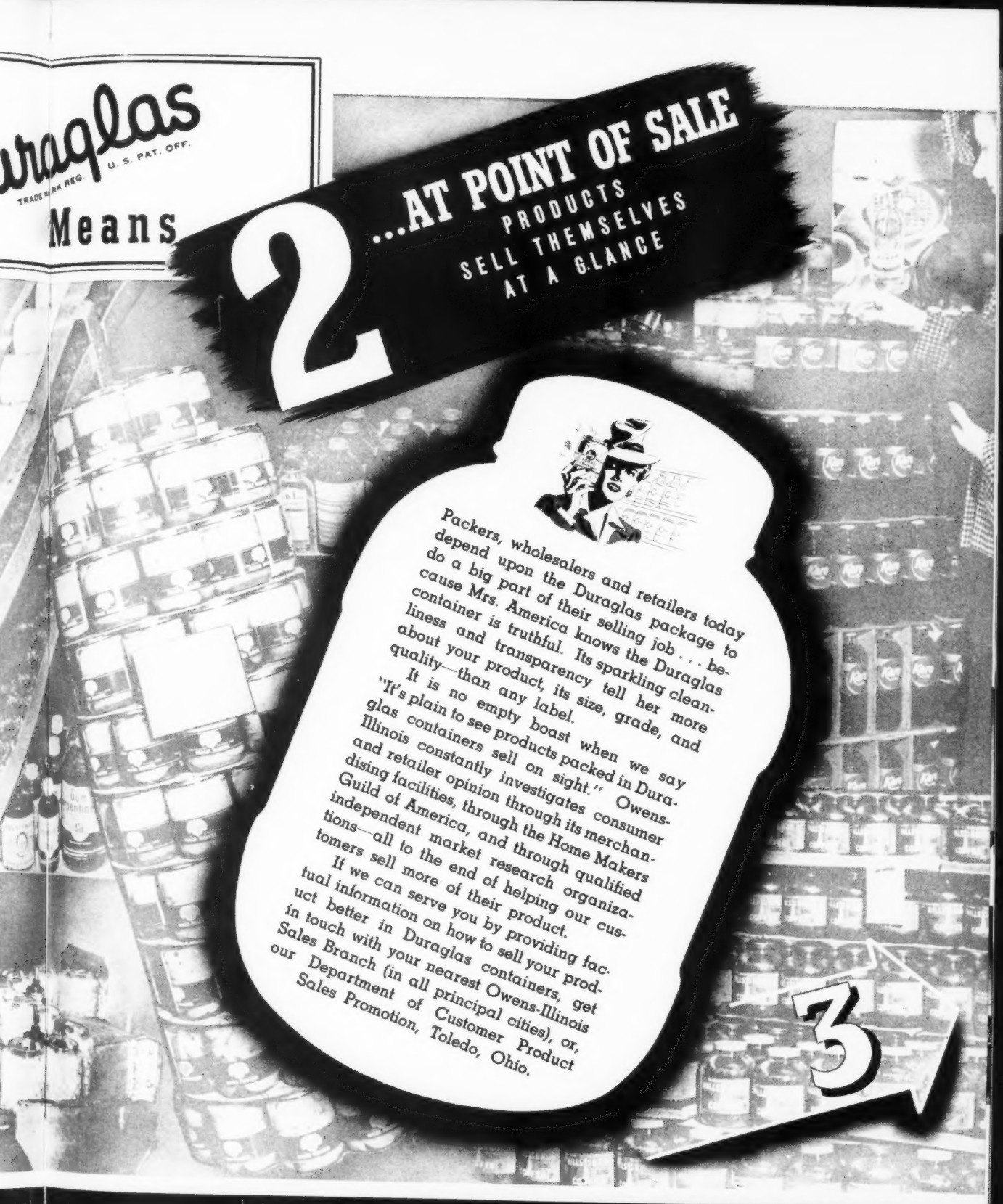
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We believe our "know-how" is valuable to glass users,—specifically, to our customers. That is why today our Packaging Research and Customer Planning Division holds a place of unparalleled importance in our sales planning for postwar, and in the production planning of many Owens-Illinois customers.

This Division is constantly developing and investigating new and less expensive glass handling methods,—applying to your production operation the benefits and economies of standardization of containers and straight-line, mass production glass handling techniques . . . bringing to you the advantages of lower costs in almost every phase of your processing and handling operations.

It's plain to see.. **Products Packed in D**

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d in Duraglas Containers..sell on sight

XUM

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CONVENIENCE THAT GIVES "A LIFT TO LIVING"...



Duraglas packaging protection and convenience features carry far beyond the point of sale right into the homes of your customers . . . another significant reason why Mrs. America prefers the container that gives your product a "Lift to Living."

No matter what your product may be—fruits and vegetables, juices, baby foods, coffee, beer and beverages, dairy products, pharmaceuticals or household products—there is a Duraglas container that will provide a "Lift to Selling" your product in tomorrow's market.

Today's substantial trends to self-service in ALL types of retail operation—PLUS the growing popularity of mass display techniques in retail selling—will place an unusual sales burden on your package of tomorrow. That is why we say: "Investigate the Duraglas package now...Tomorrow's package, here today."

Among the many "Lift-to-Living" conveniences Duraglas containers give your product, reasons why women especially prefer the glass package, are:—(1) Cleanliness and sanitation. (2) Closure-convenience and air-tight reseal features. (3) Storage-convenience in original container. (4) Convenience of serving many products in original container. (5) Visual inventory features—They can see when to buy more. (6) Buying-convenience—Glass is truthful, glass tells ALL.

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This building could aptly be called "The University of Glass." Actually, it houses our Packaging Research & Customer Planning Division laboratories. Within its walls has originated almost every major glass packaging development of recent years.

This map indicates location of every Owens-Illinois Branch Sales Office, —39 in all, strategically located in principal cities from Coast to Coast. No matter where you are, Owens-Illinois Complete Packaging Service is no further from you than your telephone.



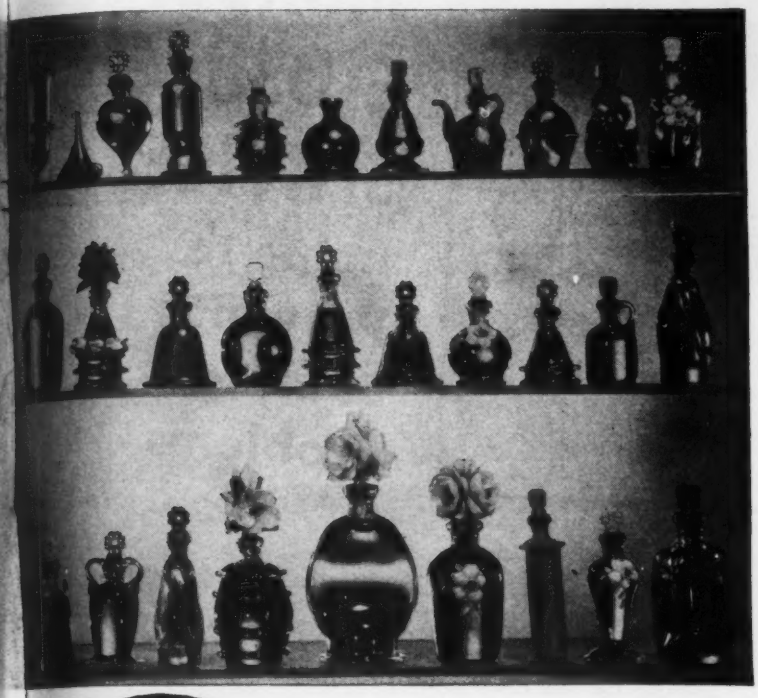
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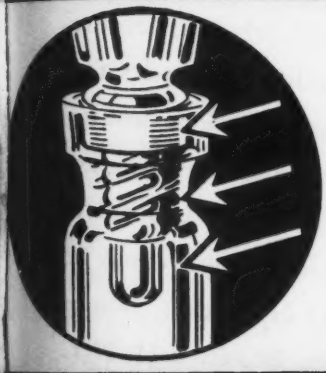


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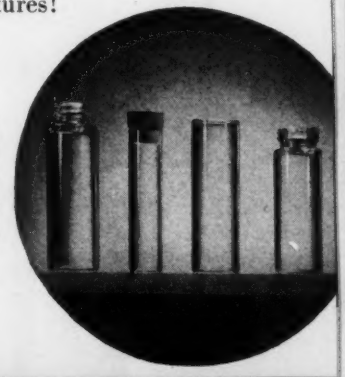
For greater prestige—for interest—for eye-appeal, investigate these unique, sales-building Miniatures!

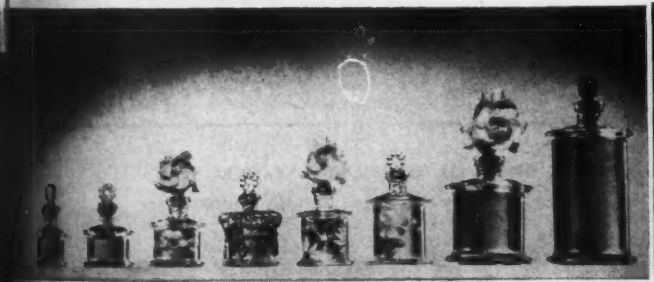


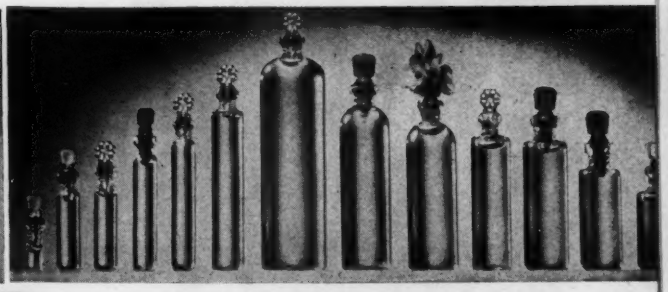
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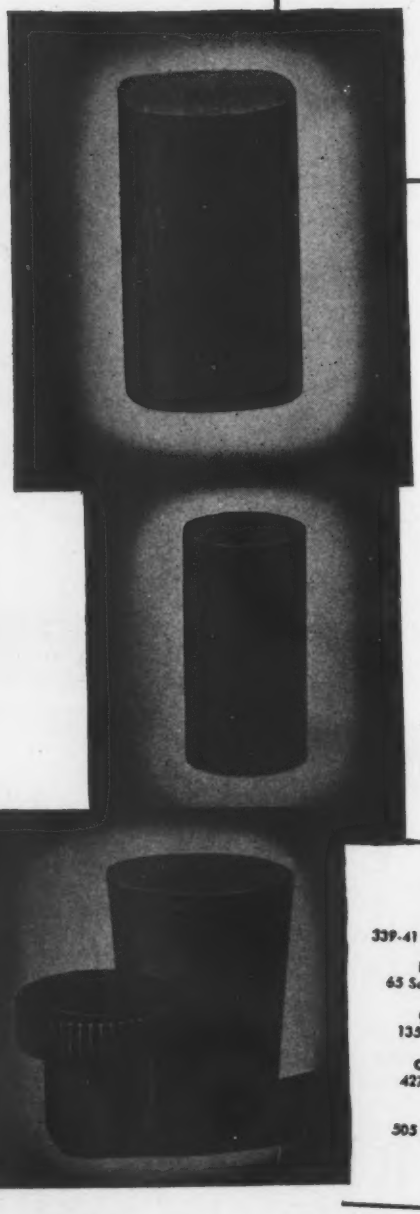
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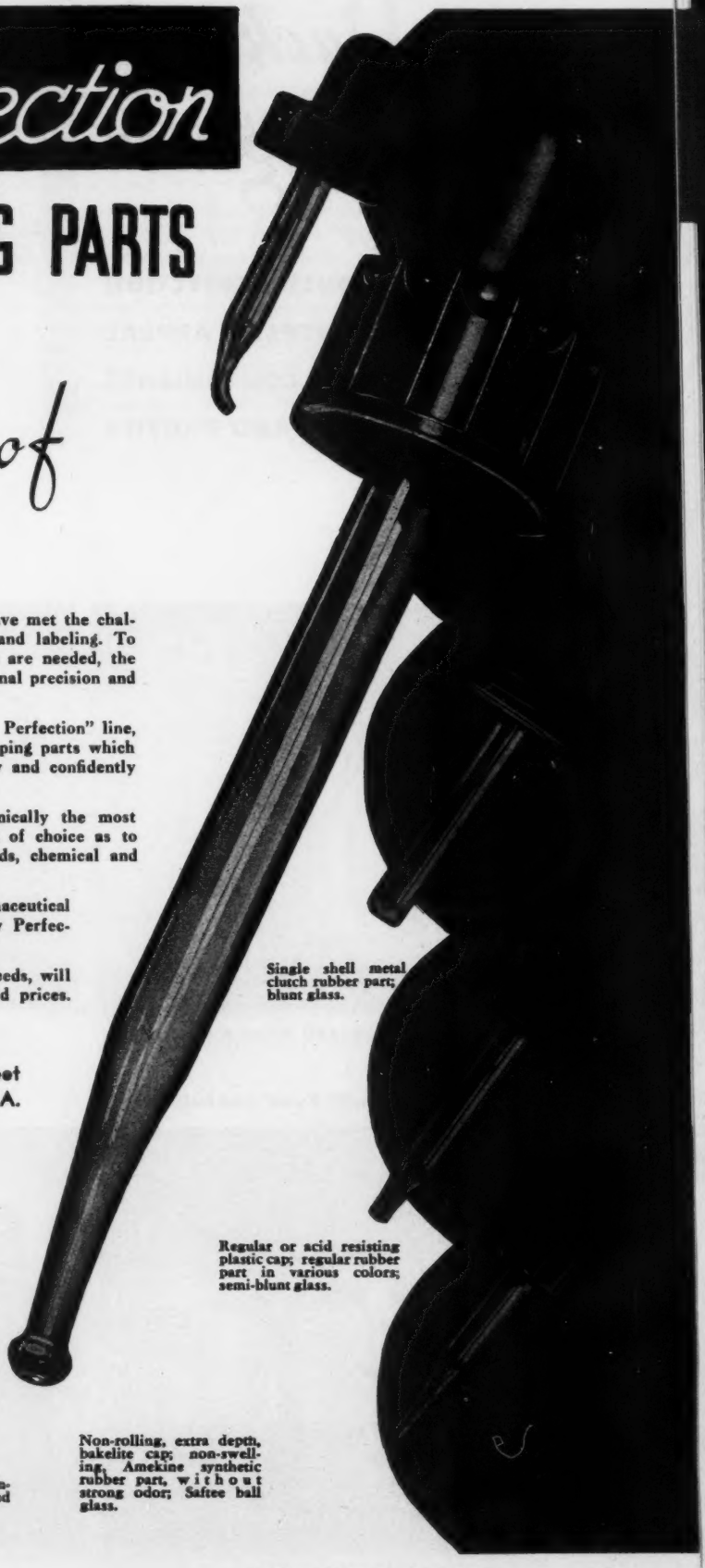
You, the successful manufacturer of pharmaceuticals, have met the challenge of the day for classic distinction in packaging and labeling. To meet the challenge of tomorrow, where dropping parts are needed, the distinctive and attractive must be combined with functional precision and adaptability.

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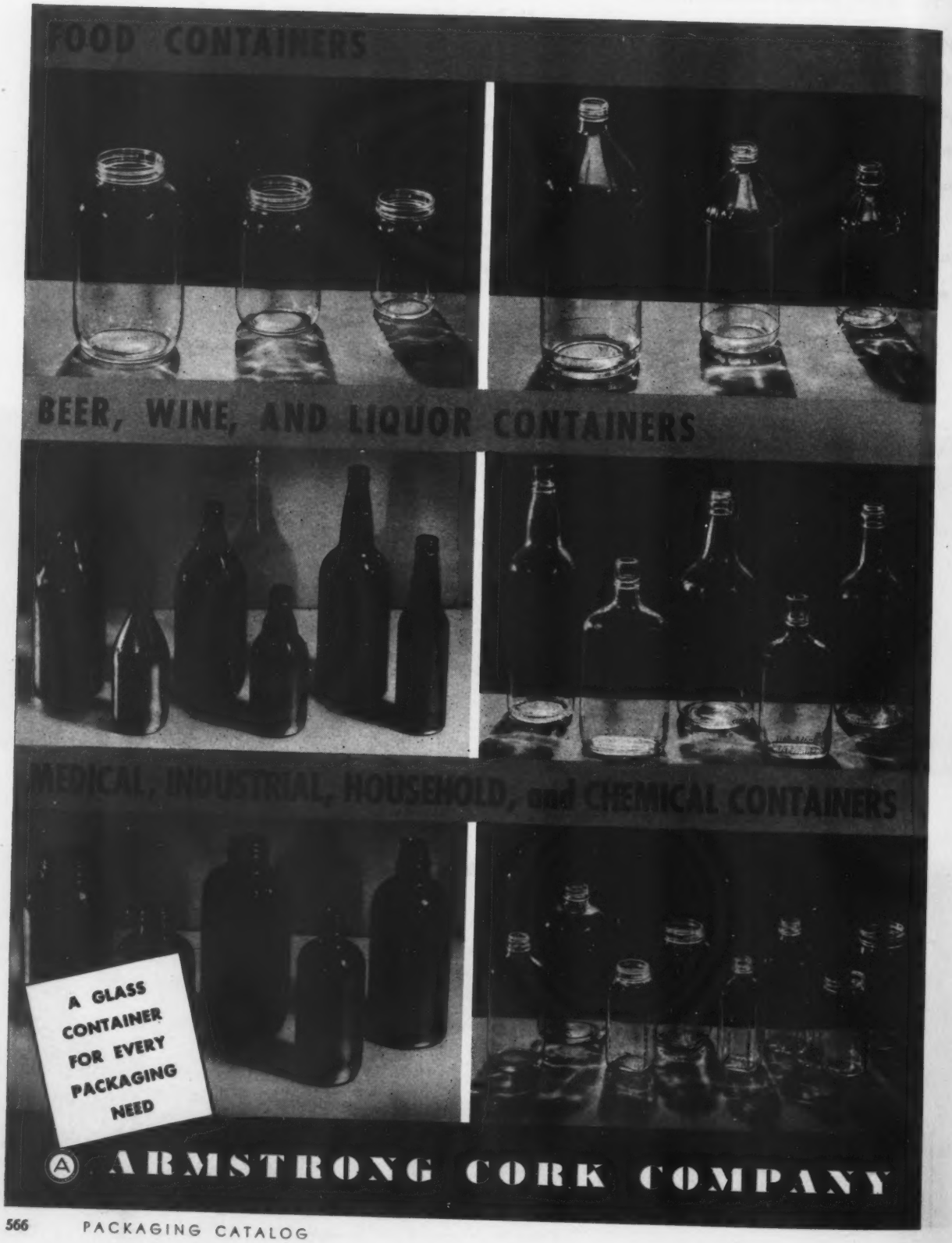
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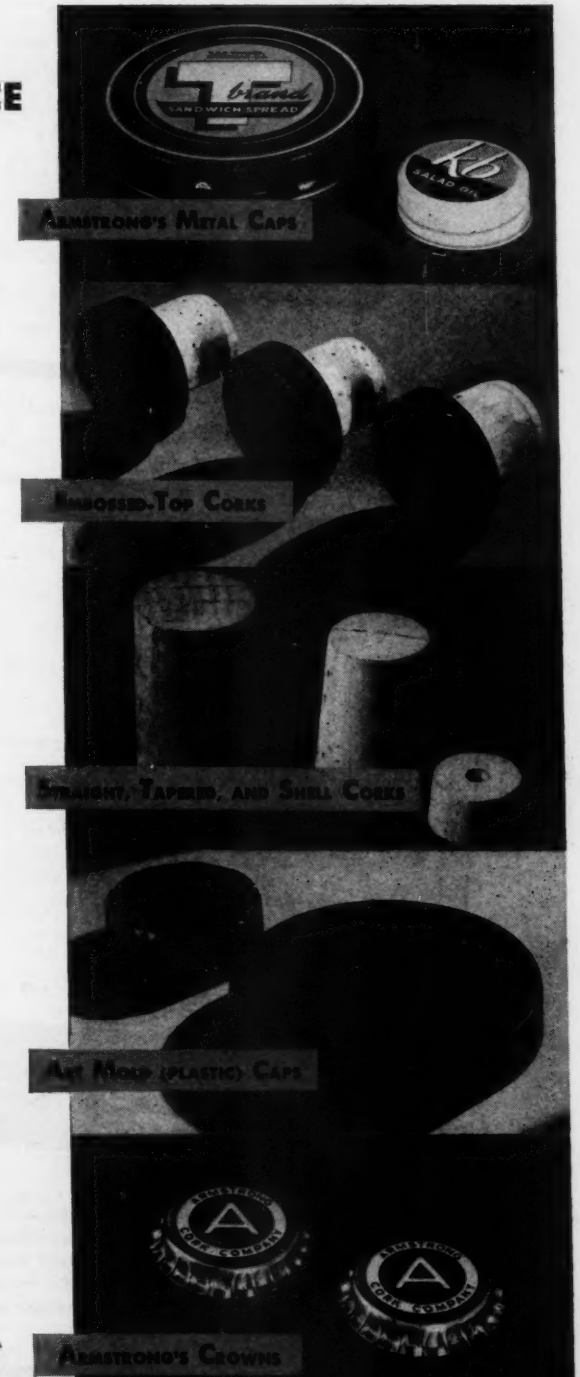
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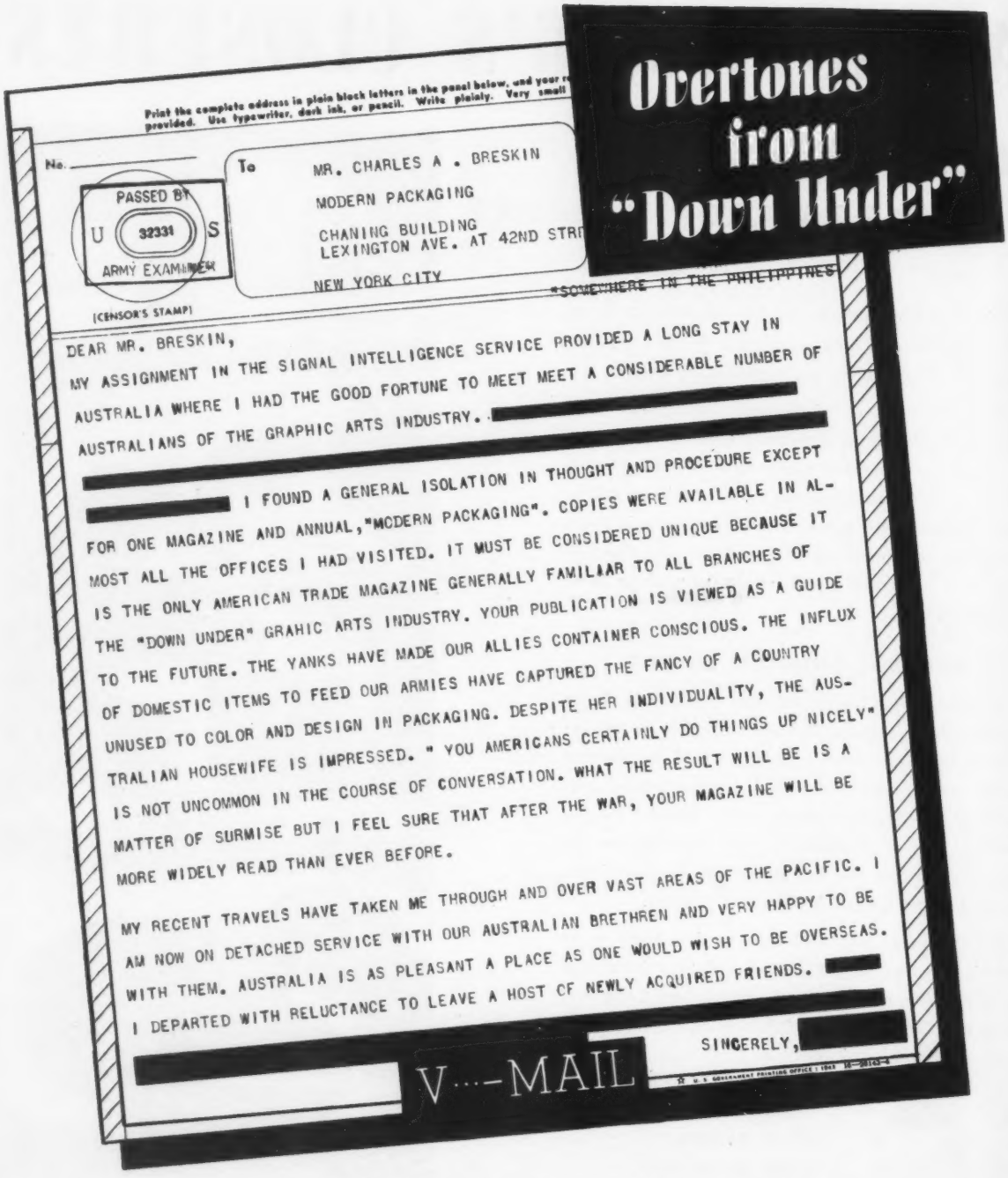
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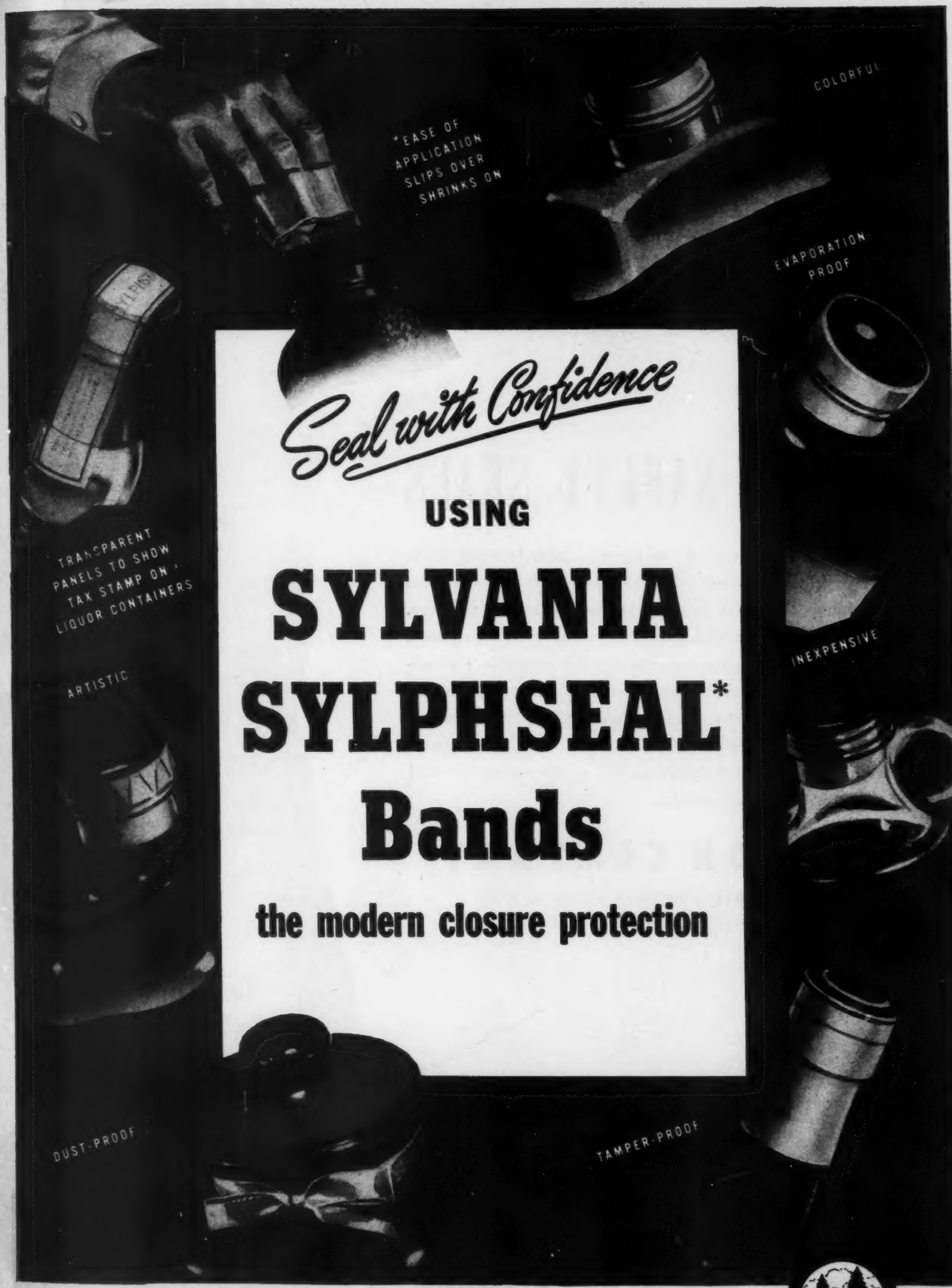
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PLASTICS

Basic considerations 574

Plastic materials used in packaging 575

Manufacturing methods 579

Molded containers 582

Fabricated containers 584

Semi-rigid seamless vials 588

Plastic closures 589

Design suggestions for molded parts 592

Printing on plastics 594

Stock molds 596

Plastic strip coating 597

Trends to watch 598

Chart: Plastics for packaging at a glance opposite 576

Chart: Properties of molded and cast plastics used in packaging opposite 596

Basic considerations



1



2



↓4 3



Chemically, plastics are complex, but their production into finished articles for packaging purposes follows simple and well-defined channels. The basic raw material is usually a resin, substantially a pure chemical product which is made principally by the large chemical companies. They compound it with plasticizers and with wood-flour and other fillers to produce a molding powder. The molding powder is purchased by custom molders (there are now more than 1000 in this country) who turn out containers, closures and parts to the packager's specifications.

Distinct from the molders are the fabricators, who purchase from the basic manufacturers plastic sheets, rods and tubes in standard sizes and turn them into drawn and set-up containers, display components, etc.

The chemical complexity of plastics is one of their great advantages. From a dozen basic types several thousand different formulations are available. Although no one plastic will do everything, it is a fact that a plastic can be compounded to meet any specific physical or chemical requirement and almost any combination of requirements.

The packager who does not wish to delve further into the subject needs only to put himself in the hands of a reliable molder or fabricator, provide him a sample of the product to be packaged, and depend upon him to recommend the best and most economical material and manufacturing method. However, a brief study of the information contained in this chapter will provide a useful background of knowledge.

First of all the packager must weigh the advantages and disadvantages of plastics against those of other materials. Plastics are sturdy and long-lived; they are best suited for use where continued use after the product has been purchased may be expected—as, for instance, a drug or cosmetic package. They appeal to the senses through color or transparency and through their pleasing texture. Many of the packaging plastics are chemically inert and nontoxic; others would not be chemically suitable for certain products. Attention must be given to physical strength, dimensional stability, the MVT rate and the possible effect of sunlight and extreme heat and cold.

Finally, cost must be weighed. Plastics are still not generally low-cost materials. But their use is justified if they offer appearance or practical advantages that outweigh the extra cost. And the cost differential is steadily dwindling due to wartime expansion of raw material output and developments in automatic fabrication.

1—This idea has a future—bright plastic shoulder and cap on metal-bottomed paper container for powders. Photo, American Cyanamid. 2—Cost of plastic must be measured against "in use" value. Photo, Monsanto. 3—Idea: ring of acetate attached to closure has nail-shaped sample of enamel for "try-on." Photo, Monsanto. 4—Thought given to design for plastic containers saves money. This rouge box with ivy finish is efficient and it costs less. Photo, Victor Metal Products.

Plastic materials used in packaging

So far as packagers are concerned, "standard" plastics—meaning those available commercially prewar—may be conveniently classified in three categories: compression molding compounds, injection and extrusion molding compounds, and rigid sheets. Not included in this discussion are foils or films, nor those plastic materials used for treating, for adhesives or for coatings—all of which are discussed elsewhere in this volume. (See *Adhesives and Adhesive Tapes*, p. 331 ff.; *Coatings*, p. 375 ff.; *Wrappings and Laminations*, p. 411 ff.)

Molding materials, both injection and compression, offer basic advantages for packaging. Once a mold is built, millions of identical units can be made on a mass-production basis. Such units may be as intricate as the designer's fancy calls for, without penalty in cost, so long as a few well-defined precautions are observed. Dimensions can be held to close tolerances and details reproduced with mirror-like fidelity. Surface treatment, either a high polish or an overall decorative effect, is applied permanently in the molding operation. Lettering or brand designs are applicable.

Alternately, marking or identification can be applied to a molded part by any of a number of processes. The color of a molded part goes through the mass of material; it can neither wear away nor can it tarnish.

Plastic materials are either thermosetting (unchangeable after molding) or thermoplastic (capable of remolding). The materials listed below under "Compression Molding Materials" are all thermosetting; those listed under "Injection and Extrusion Molding Materials" and "Rigid Sheetings" are all thermoplastics. The sketches reproduced below show graphically the fundamental differences between thermosetting and thermoplastic materials.

Compression molding materials

Compression molding compounds, which include phenolics, urea and the newer melamine materials, are the oldest of the molding plastics.

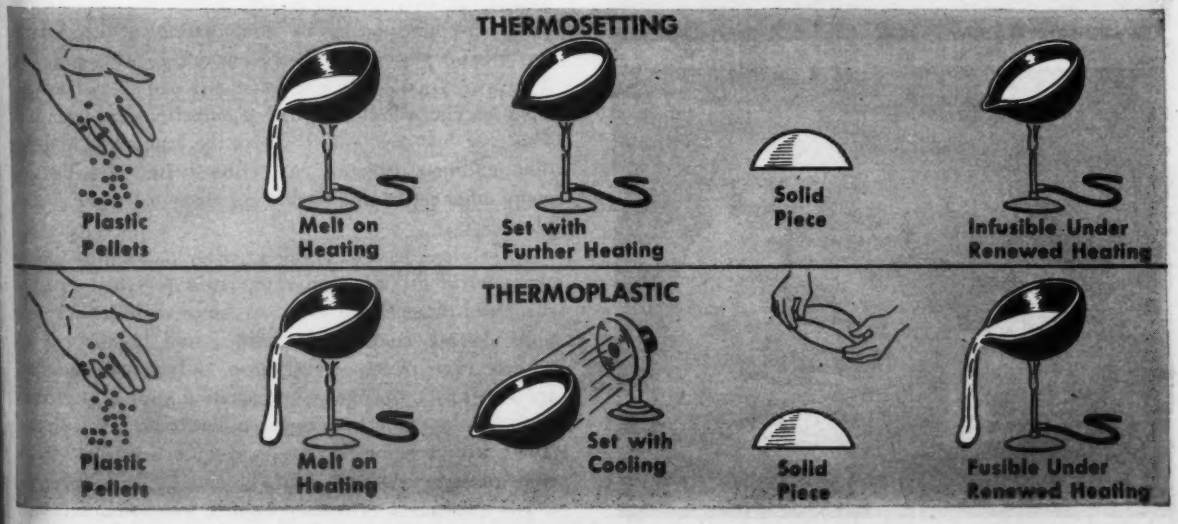
Phenolics are rigid, tough, water-resistant, dimensionally stable, low-cost plastics usually found in opaque black or brown colors. They have found their greatest packaging uses in bottle and jar closures, of which millions are produced annually. The materials used are specially formulated for high torque strength, high water resistance, good gloss and minimum odor and taste characteristics. The molding methods are highly developed, utilizing specialized machines, engineered specifically for closure production. Volume production of high-quality caps at a low cost is thus obtained. It is unlikely that phenolics will be displaced in this field. They are most widely seen on wine and liquor bottles and on prescription bottles, for which they are now virtually standard. During the war supplies of raw materials have been conserved by extending the phenolics compounds with lignin fillers, but not without sacrifice in water resistance and appearance.

Phenolics have also been used in molded boxes, particularly those intended for consumer re-use and as premiums. The advent of other materials with greater color range at competitive cost may limit further growth of phenolics in this field.

Ureas are generally similar to phenolics, but provide a range of translucent and opaque colors including whites. This advantage justifies their higher cost in a number of uses. Urea is not as strong as most phenolics and it has somewhat lower water resistance.

Urea is used in large volume for closures, particularly

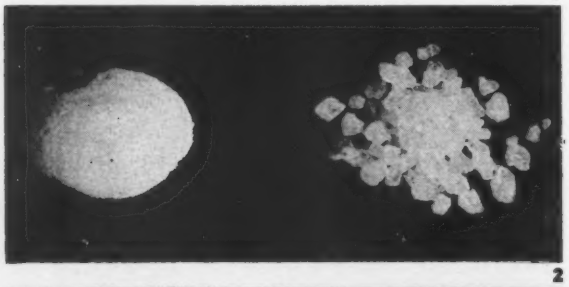
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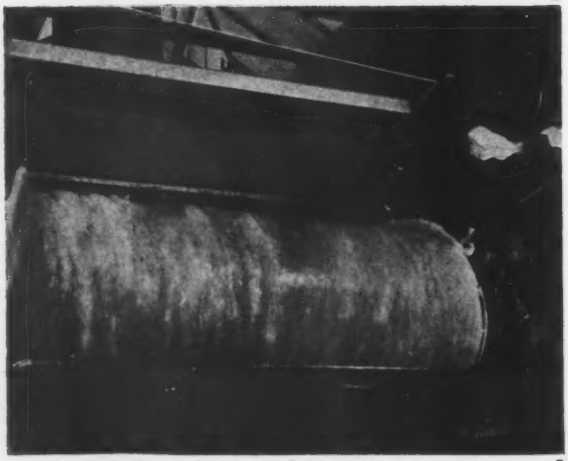
in the food and cosmetic trades, where its lustrous beauty often is the key of the package styling. Urea has also been well proved in hundreds of applications where it serves as the primary container. Cosmetic jars, using urea either alone or in combinations with other plastics, are good examples. It has become familiar in boxes for gift merchandise, watches and jewelry. In these, antique ivory effects are obtained through wiped-in lettering or decorations. Premium packages or related items have long constituted an important urea use. Kitchen cleanser holders and premium measuring spoons are typical.

1—Plastic materials used for molding: powder is employed for compression, crystals for injection or extrusion. Both of these are methyl methacrylate. Photo, E. I. du Pont de Nemours & Co., Inc. 2 & 3—Steps in the production of acetate sheeting. Photo, Modern Plastics.

1



2



3



Melamine materials combine the color advantages of urea with the greater toughness, water resistance and stability of phenolics. These properties, though, are of greatest importance in non-packaging uses, since ureas have provided adequate properties to the packager except in very unusual cases. Melamine compounds are more expensive than urea, and where their properties are demanded, it is likely that urea-melamine blends will be used. Such cases might be those where very high water resistance and freedom from warpage is demanded in a light-colored compression molding compound.

Injection and extrusion molding materials

In injection molding materials, plastics have found their greatest growth. The process, which reached commercial status only a little more than a decade ago, made available for packaging use a group of materials not economically adaptable to the older compression process.

The basic advantage of injection molding, aside from the qualities of the materials themselves, are high speed, virtually automatic, low-cost production. Compared to most compression molding, which involves "curing" periods of varying duration, injection is considerably cheaper—enough cheaper in many cases to offset the higher cost, prewar, of injection materials. An exception to this cost comparison, however, is the automatic high speed molding of phenolic or urea bottle closures.

Injection molding materials, although differing in many respects, have several characteristics in common. They are all basically transparent and have thus an unlimited color range, including transparent colors unavailable in compression molding types. In general, they have good dimensional stability and high resistance to water and other liquids and chemicals. The same materials may be used in extrusion molding. They include polystyrene, methacrylate, vinyl copolymer, vinylidene chloride and the cellulose family of acetate, acetate-butyrate and ethyl cellulose. Some of these are important, too, as sheet materials, but for the moment their uses as molding compounds are considered.

Polystyrene is the most important injection plastic in packaging. Even as a relatively high cost material on a price-per-pound basis, its combination of appearance factors and physical properties won a growing place for it prewar. During the war years, the cost of polystyrene has been cut in half and further reductions are promised. This new low cost, coupled with the economies of injection molding, makes it competitive with phenolics and many other packaging media and cheaper than any other plastic.

Polystyrene has the excellent color possibilities which characterize all injection compounds together with unsurpassed dimensional stability. Since molding formulations do not contain plasticizers, and because of extremely high moisture resistance, polystyrene moldings are free from shrinkage or variation over a period of time. It is possible to design a polystyrene cosmetic container with friction-fit top—a specification difficult for other plastics to meet.

The material is extremely light in weight—about ⅓ as



PLASTICS FOR PA

COMPRESSION MOLDING MATERIALS

MATERIAL	PHENOLIC (Wood-flour-filled phenol-formaldehyde or phenol-furfural molding materials)	UREA (Cellulose-filled urea-formaldehyde molding materials)	MELAMINE (Cellulose-filled melamine-formald material)
RELATIVE MATERIAL COST	 10 UNITS	 24 UNITS	 39 UNIT
HOW TO IDENTIFY FINISHED PARTS	Very rigid, with no give when stressed. Does not burn readily. Colors black, brown or dark; always opaque. Luster not as high as thermoplastic.	Very rigid with little "give" when stressed. Burns very slowly, or not at all, with characteristic odor, extinguishing when flame is removed. Usually in opaque or translucent white or pastel colors. High luster.	Similar to urea, difficult to distin
GENERAL CHARACTERISTICS	Color limited to dark opaque shades; tendency in lighter colors to discolor. Luster good but not as high as thermoplastics; fair to good resistance to scratching. Excellent dimensional stability in proper formulations. No plasticizer and low shrinkage. Lower water absorption than thermoplastics except styrene. Excellent mechanical properties, high rigidity, high torque strength. Shock strength good but lower than vinyl or cellulose materials. Heat resistance better than any other packaging plastic (about 275° F.). Formulations available with minimum taste and odor characteristics. Excellent resistance to alcohols, oils, greases, petroleum derivatives and to weak acids. Poor resistance to alkalis.	Colors include all whites and all shades (light fast) in opaque and translucent. No crystal. Excellent luster, comparable to thermoplastics. Fair dimensional stability because of shrinkage and water absorption. Better than acetate but inferior to other plastics. Strength properties good. High rigidity. Heat resistance (about 190° F. for short periods) better than thermoplastics but inferior to phenolic. Excellent taste and odor characteristics. Good resistance to alcohols, oils, greases and to weak acids. Poor to fair resistance to alkalis.	Color range (same as urea) includ pastels (light fast) in opaque and t crystal. Excellent luster. Excellent dimensional stability, phenolics. Low water absorption a age than urea. Strength properties comparabl High torque and good shock stre sistance almost as high as phenolic better than urea plastics. Excellent taste and odor characte Excellent resistance to alkalis, m other compression materials, very to oils, greases and organic solven ance to acids. (Melamine-urea blends retain to features of straight melamine at lo
TYPICAL PACKAGING USES	Bottle and jar closures. Reuse boxes. Displays for small products.	Closures, jewelry boxes, cosmetic containers, displays.	Same as urea to meet more strin
TRADE NAMES	Bakelite, Durez, Durite, Makalot, Resinox, Textolite, Insurok.	Bakelite urea, Beetle, Plaskon.	Catalin melamine, Melmac, Plas Resimene.

TICS FOR PACKAGING AT

DING MATERIALS

	MELAMINE (Cellulose-filled melamine-formaldehyde molding material)	ACETATE (Cellulose acetate rigid sheeting)
maldehyde molding ls)		
		
when stressed. Burns th characteristic odor, removed. Usually in or pastel colors. High	Similar to urea, difficult to distinguish.	Clear transparent. Somewhat more britt flexing than other rigid sheets. Stacked show bluish color. Burns slowly with charact odor.
and all shades (light ent. No crystal. Ex- thermoplastics. because of shrinkage r than acetate but in- High rigidity. Heat short periods) better rior to phenolic. aracteristics. s, oils, greases and to tance to alkalis.	Color range (same as urea) includes all whites and pastels (light fast) in opaque and translucent. Not crystal. Excellent luster. Excellent dimensional stability, comparable to phenolics. Low water absorption and lower shrinkage than urea. Strength properties comparable to phenolics. High torque and good shock strength. Heat resistance almost as high as phenolics (about 250° F.) better than urea plastics. Excellent taste and odor characteristics. Excellent resistance to alkalis, much better than other compression materials, very good resistance to oils, greases and organic solvents. Good resistance to acids. (Melamine-urea blends retain to some degree the features of straight melamine at lower cost.)	Excellent retention of clarity and transpa Surface scratches fairly easily. Fair to good dimensional stability; warps varying humidities. Poor moisture barrier. Good strength properties, usually protect shipping. Heat resistance low but adequate. Good fabricating properties. Bends, score cuts beads readily at room temperatures. F good hot-drawing. Cements easily. Takes pr and marking well. Excellent resistance to most oils and greases acids and alkalis. Poor resistance to organi vents.
cosmetic containers,	Same as urea to meet more stringent conditions.	Rigid transparent boxes, tubes, covers an plays.
on.	Catalin melamine, Melmac, Plaskon melamine, Resimene.	Eastman acetate, Lumarith, Vuepak.

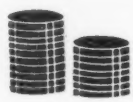
*Direct comparison of cost between sheet and moldi

AT A GLANCE

RIGID SHEET*

heeting)	ETHYL CELLULOSE (Ethyl-cellulose rigid sheeting)	VINYL SHEETING (Vinyl chloride-acetate copolymer rigid transparent sheeting)	MATERIAL
 56 UNITS	 56 UNITS	 56 UNITS	RELATIVE MATERIAL COST
more brittle on Stacked sheets ith characteristic	Not readily distinguishable from acetate. Somewhat less brittle on flexing.	Not readily distinguishable from other sheeting. Less brittle on flexing. Stacked sheets may show slight tannish color. Usually self-extinguishing.	HOW TO IDENTIFY FINISHED PARTS
nd transparency. lity; warps under e barrier. ally protected in t adequate. Bends, scores and eratures. Fair to y. Takes printing and greases, weak ce to organic sol-	Excellent retention of clarity and transparency. Surface scratches fairly easily. Burns slowly. Fair to good dimensional stability, warps under varying humidities, slightly lower water absorption than acetate. Poor moisture barrier. Good strength properties, somewhat better than acetate, with no low-temperature embrittlement but shipping protection needed. Heat resistance low but adequate. Excellent fabricating properties. Bends, scores and cuts readily even at low temperatures. Excellent hot-drawing. Cements easily and takes printing and marking well. Excellent odor and taste characteristics. Excellent resistance to most oils and greases and to weak acids and alkalis. Poor resistance to organic solvents.	Good retention of clarity and transparency, with some tendency to yellowing on aging. Surface scratches fairly easily. Good dimensional stability, because of low water absorption and low plasticizer. Less warpage than in cellulose materials. Poor moisture barrier. Good strength properties, somewhat better than cellulose materials. Less brittle than acetate, no low-temperature embrittlement. Heat resistance low but adequate. Excellent fabricating properties. Bends, scores, cuts and beads readily even at low temperatures. Excellent hot-drawing. Cements easily and takes printing and marking well. Excellent resistance to strong acids and alkalis, alcohols, oils and greases. Attacked by some organic solvents.	GENERAL CHARACTERISTICS
, covers and dis-	Rigid transparent boxes, tubes, drawn covers and display components.	Same as for ethyl cellulose, particularly for drawn components.	TYPICAL PACKAGING USES
uepak.	Ethocel, Lumarith E. C.	Vinylite sheet.	TRADE NAMES

eet and molding materials should be avoided; containers made of sheet generally require much thinner wall thicknesses.

MATERIAL	S (Polystyre
RELATIVE MATERIAL COST	
HOW TO IDENTIFY FINISHED PARTS	Very rigid. like tinkle Burns mode flame and ch black, stick crystal or lig
GENERAL CHARACTERISTICS	Complete cluding tra superior to acrylic. Hi scratched. Extremely bility—free f age because negligible wa Usually brittle, alth high. Very l or shocked. ance (about aging uses. Almost c taste and od Unaffected alkalis and to petroleu essential oil
TYPICAL PACKAGING USES	Cosmetic closures, cry general pu tions.
TRADE NAMES	Bakelite tron, Styro

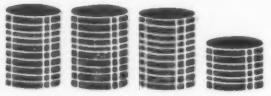
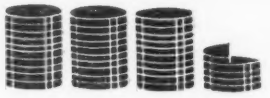
INJECTION MOLDING MATERIALS

STYRENE (Polystyrene molding material)	ACETATE (Cellulose acetate molding material)	ACETATE-BUTYRATE (Cellulose acetate-butyrate molding materials)	ETHYL-CELLULOSE (Ethyl-cellulose molding material)	ACR (Methyl-metha mate
 17 UNITS	 32½ UNITS	 33⅓ UNITS	 36 UNITS	
Very rigid. Breaks sharply. Glass-like tinkle sound when dropped. Burns moderately slowly with smoky flame and characteristic odor, leaving black, sticky residue. Transparent crystal or light colors usual.	Flexible in thin sections, but not elastic. Dull sound when dropped. Burns slowly with characteristic odor. Usually in bright opaque or transparent colors.	Similar to acetate. Characteristic odor when warm or being molded. Distinctive odor when burned.	Similar to acetate, not readily distinguishable.	Quite rigid, but w styrene. Sharper so than acetate. B Usually in crystal t
Complete range of fast colors including transparent, with clarity superior to other plastics except acrylic. High luster surface, easily scratched. Extremely high dimensional stability—free from warpage and shrinkage because of no plasticizers and negligible water absorption. Usually considered somewhat brittle, although tensile strength is high. Very little "give" when stressed or shocked. Adequate heat resistance (about 160° F.) for most packaging uses. Almost complete freedom from taste and odor. Unaffected by all common acids, alkalis and alcohols. Poor resistance to petroleum derivatives and certain essential oils.	Complete range of fast colors including transparent. Fair resistance to scratching. High luster. Fair dimensional stability on exposure to varying humidities because of water absorption—tending to shrinkage because of plasticizer content. Tough and shock-resistant. "Gives" considerably under stress before breakage. Adequate heat resistance for most packaging uses, although somewhat lower than other plastics (about 170° F.). Odor- and taste-free formulations available. Excellent resistance to oils, greases, other petroleum derivatives. Moderate resistance to acids and alkalis. Affected by alcohols and derivatives.	Range includes all fast colors but relatively poor in clear transparent. Best in opaque tints. High luster. Good resistance to scratching. Good dimensional stability and resistance to warping and shrinking because of low plasticizer content and water absorption. Very tough and shock resistant. Heat resistance comparable to acetate. Poor odor and taste characteristics. Excellent resistance to oils, greases, other petroleum derivatives. Good resistance to weak acids and alkalis. Affected by alcohols and derivatives.	Complete range of fast colors, including transparent. High luster. Good dimensional stability—better than acetate, equivalent to acetate-butyrate. Low water absorption. Very tough, equivalent to acetate-butyrate. Heat resistance adequate, but as low as acetate. Excellent retention of strength and flexibility at sub-zero temperature. Excellent odor and taste characteristics. Excellent resistance to oils, greases, other petroleum derivatives, and to weak and strong alkalis. Moderately resistant to weak acids. Affected by strong acids, alcohols and derivatives.	All colors, most c crystal transparen passed brilliance a durable luster than Excellent dime better than cellulo of no plasticizer. higher than styren tate. More flexible an styrene, although cellulose material resistance (about 1 heat-resistant form Complete freedo taste. Excellent resist acids. Affected some alcohols, an oils.
Cosmetic containers, acid bottle closures, crystal boxes for small parts, general purpose injection applications.	Jewel boxes, containers for other dry products, closures and display components.	Molded boxes, containers for mechanical parts.	Cigaret boxes, containers to meet low-temperature conditions.	Transparent m metics, jewelry an Displays.
Bakelite polystyrene, Loalin, Lustron, Styron.	Bakelite cellulose acetate, Fibestos, Lumarith, Nixonite, Plastacele, Tenite I, Vimlite.	Tenite II.	Ethocel, Lumarith E. C., Nixon ethyl-cellulose.	Lucite, Plexiglas.

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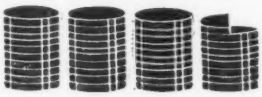
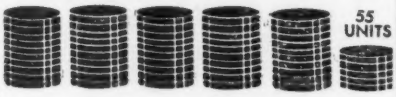
XUM

NJECTION MOLDING MATERIALS

ACETATE-BUTYRATE (Cellulose acetate-butyrate molding materials)	ETHYL-CELLULOSE (Ethyl-cellulose molding material)	ACRYLIC (Methyl-methacrylate molding material)	VINYL COPOLYMER (Vinyl acetate-chloride copolymer molding material)
			
Similar to acetate. Characteristic odor when warm or being molded. Distinctive odor when burned.	Similar to acetate, not readily distinguishable.	Quite rigid, but with more give than styrene. Sharper sound when dropped than acetate. Burns very slowly. Usually in crystal transparent.	Flexible but not usually elasti Dull sound when struck. Will n burn when flame is removed. Di tinctive odor when hot. Colore transparents usual.
Range includes all fast colors but relatively poor in clear transparent. Best in opaque tints. High luster. Good resistance to scratching. Good dimensional stability and resistance to warping and shrinking because of low plasticizer content and water absorption. Very tough and shock resistant. Heat resistance comparable to acetate. Poor odor and taste characteristics. Excellent resistance to oils, greases, other petroleum derivatives. Good resistance to weak acids and alkalis. Affected by alcohols and derivatives.	Complete range of fast colors, including transparent. High luster. Good dimensional stability—better than acetate, equivalent to acetate-butyrate. Low water absorption. Very tough, equivalent to acetate-butyrate. Heat resistance adequate, but as low as acetate. Excellent retention of strength and flexibility at sub-zero temperature. Excellent odor and taste characteristics. Excellent resistance to oils, greases, other petroleum derivatives, and to weak and strong alkalis. Moderately resistant to weak acids. Affected by strong acids, alcohols and derivatives.	All colors, most commonly in clear, crystal transparency with unsurpassed brilliance and clarity. More durable luster than styrene. Excellent dimensional stability, better than cellulose plastics because of no plasticizer. Water absorption higher than styrene, lower than acetate. More flexible and less brittle than styrene, although not as tough as cellulose materials. Adequate heat resistance (about 160° F.) with higher heat-resistant formulations available. Complete freedom from odor and taste. Excellent resistance to common acids. Affected by strong alkalis, some alcohols, and certain essential oils.	Full range of colors, with sligh tendency to yellow on sunlight e posure. Crystal not as brilliant other injection materials. Excellent dimensional stability b cause of low or no plasticizer. Lo water absorption. Virtual freedo from warping. Very tough and shock resistan comparable to or better than acetat butyrate. Adequate but low (abo 140° F.) heat resistance. Good lo temperature properties. Good odor and taste characteristic Excellent resistance to oils, greas acids and alkalis. Good resistance alcohols.
Molded boxes, containers for mechanical parts.	Cigaret boxes, containers to meet low-temperature conditions.	Transparent molded boxes, cosmetics, jewelry and small products. Displays.	Molded containers to meet roug varying service conditions.
Tenite II.	Ethocel, Lumarith E. C., Nixon ethyl-cellulose.	Lucite, Plexiglas.	Koroseal, Saran, Vinylite.

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CAST RESINS

YMER e copolymer rial)	CAST PHENOLIC (Cast phenol-formaldehyde resin)	CAST ACRYLIC (Methyl-methacrylate cast plate, rods, and tubes)	MATERIAL
34½ UNITS	 38½ UNITS	 55 UNITS	RELATIVE MATERIAL COST
ually elastic. k. Will not moved. Dis- ot. Colored	Very rigid and hard. Usually in thick sections. Usually in translucent and transparent colors other than crystal. Distinctive luster and depth of color. Chars but does not burn.	Very rigid. Usually in crystal transparent. Distinctive clarity and brilliance. Usually in sections not thinner than 0.030 in. Burns very slowly.	HOW TO IDENTIFY FINISHED PARTS
, with slight sunlight ex- s brilliant as ls. l stability be- sticizer. Low tual freedom ock resistant, than acetate- ut low (about e. Good low- haracteristics. o oils, greases, l resistance to	Colors include all transparent, translucent and opaque. Crystal transparent not as brilliant as thermoplastic. Tendency to yellow on aging. Good resistance to scratching. Good dimensional stability and moderately low water absorption. Some tendency to crack under varying humidities. Good mechanical properties in thick sections. Fair shock resistance. Heat resistance good (about 175° F.); discolors but does not flow at higher levels. Excellent odor and taste characteristics. Excellent resistance to oils, greases, organic solvents and weak acids. Affected by alkalis.	Unsurpassed brilliance and clarity in crystal and colored transparent (light fast). Moderate resistance to scratching. Excellent dimensional stability. No plasticizer, very low water absorption. Good strength properties; shock resistance not as high as cellulose or vinyl materials. Heat resistance low but adequate, with heat-resistant formulations available. Excellent odor and taste characteristics. Excellent resistance to common acids, alkalis and alcohols. Affected by organic solvents, petroleum derivatives.	GENERAL CHARACTERISTICS
meet rough, ns.	Display components.	Displays, luxury boxes.	TYPICAL PACKAGING USES
ylite.	Bakelite Cast Resinoid, Catalin, Gemstone, Marblette, Prystal.	Lucite, Plexiglas.	TRADE NAMES

XUM

heavy as glass and considerably stronger. Polystyrene jars are thus ⅓—1/10 the weight of glass. In shipping, in handling and in use, this light weight pays dividends in lowered cost and greater convenience.

Two cautions must be observed in using polystyrene; the material has excellent resistance to acids, alkalies and most alcohols, but it is attacked by some essential oils and aromatic chemicals. Rigid tests should be made with each particular product to be packaged before investment in molds is made. Material suppliers, however, offer free testing service, and the needed data is easily obtained. The other caution is on strength: polystyrene is somewhat brittle. Although less fragile than glass, it is not used where a high degree of shock strength is needed. Where such conditions are met, some other plastic may be used.

Vinyl chloride-acetate copolymers have found their greatest packaging use in films, foils and sheets, but they are also potentially important molding compounds for this field. Inherently, these materials are cheap and can be made from plentiful raw materials. As production increases, this basic advantage will undoubtedly be reflected in lower price. Prewar, the use of vinyl copolymer injection compounds was limited by relatively high price and packaging applications were few, but with greater availability they will bear consideration as general-purpose injection plastics.

Vinyl copolymer moldings have many properties similar to those of polystyrene—basic clarity, high dimensional stability, low moisture and water absorption and excellent resistance to chemical attack. The vinyl compounds, however, are inherently more shock-resistant and thus less fragile. They can be formulated as rigid materials or modified by plasticizers to provide a varying degree of resilience or flexibility. Rubber-like materials with perfect transparency can thus be obtained. Their availability is indeed a challenge to the creative ingenuity of postwar package designers.

Vinylidene chloride is in a status similar to that of the vinyl copolymers: it, too, was available prewar as an injection and extrusion material but demands of other fields and relatively high price limited its exploitation as a packaging medium.

Vinylidene chloride can also be varied in physical form from a tough, rigid material to a rubber-like compound. It has unexcelled chemical and solvent resistance, and might well be considered where a molding material combining color range, toughness and chemical resistance is specified. Its general purpose use will hinge largely on ability to compete pricewise in packaging applications with other plastics.

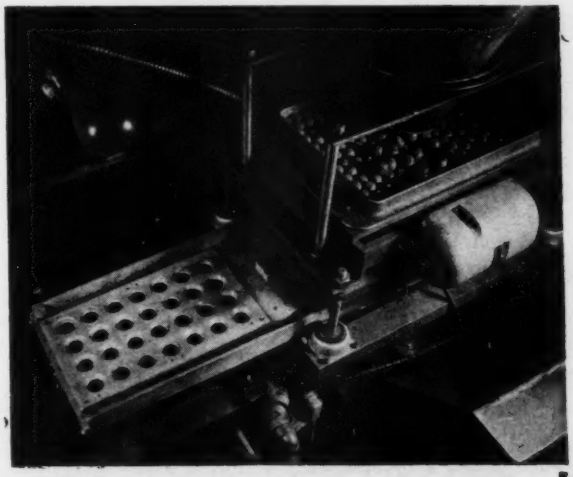
Methyl methacrylate molding material was used, when it was freely available, in a number of luxury packages. The crystal-like clarity and sparkle of methacrylate is surpassed by no other material. This feature alone justifies its use where beauty and sales appeal are at a premium. The material combines with this high appearance value a surprising degree of toughness and rigidity. Because of high water resistance and freedom from plasticizer, it is dimensionally stable and virtually non-warping and non-shrinking. It, too, is free from chemical attack by a wide range of solvents and reagents.

Cellulose plastics are most familiar in packaging as sheet materials, but as highly important injection and extrusion compounds, are also well-proved in packaging.

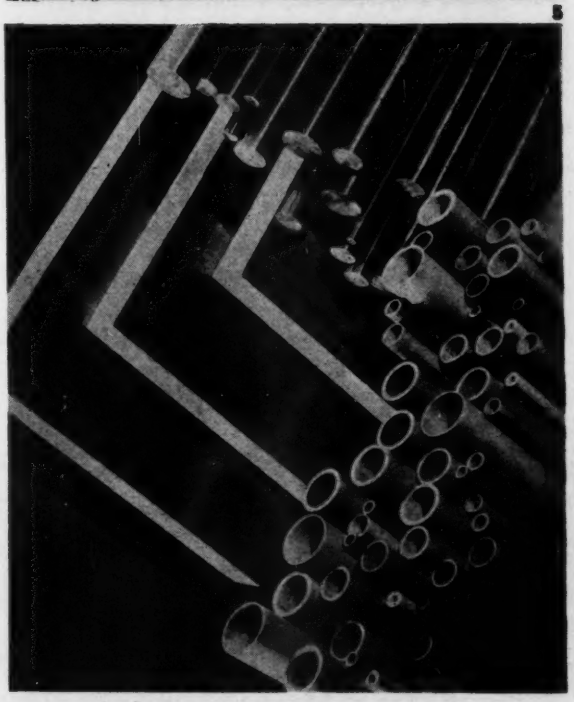
Cellulose acetate, the original injection molding plastic, is the most important of these. Acetate has the wide-ranging color that characterizes all injection compounds, with a high degree of toughness and resilience. It has been used in presentation boxes, in display components and, to a more limited extent, in closures and jars for cosmetics. In the past, it has been the general-purpose injection material and has therefore, to date, been selected as first choice of molders. *(Continued on next page)*

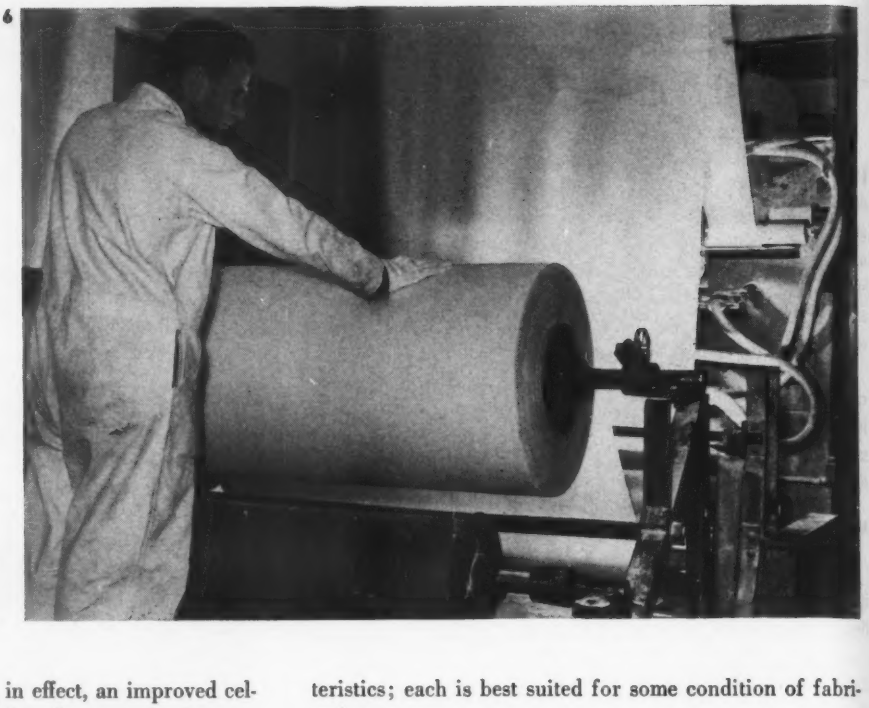
4—Many molded articles are made from plastic pellets, pre-formed from the powder as shown. 5—Laminated plastic sheets, rods and tubes are supplied in this fashion for packaging uses. Photo, General Electric Co.

4



5





6—Sheet plastics are made by molding, calendering, casting or extrusion. This photo shows sheet vinyl being wound at the end of a continuous extrusion machine. Photo, Monsanto.

Cellulose acetate butyrate is, in effect, an improved cellulose material. It is even tougher than acetate, is more water-resistant and considerably more stable dimensionally over a period of time. The requirements of most packaging applications of injection molded cellulose materials, however, have been well met by cellulose acetate, and butyrate has not been too widely used.

Ethyl cellulose materials too, are best known in packaging as sheets and films. The molding materials retain the basic characteristics of the cellulose family, with considerably lower water absorption than acetate and somewhat greater toughness. Ethyl cellulose is also marked by its retention of strength and flexibility at low temperatures. Ethyl cellulose has also become important in the past year as the basic material in compounds used as hot melts for the protective coating of metal parts. This strip-coating package, which promises to have considerable importance postwar, is discussed in another section of this chapter (see *Plastic Strip Coating*, p. 597).

Rigid sheetings

Plastic sheet materials discussed in this classification comprise those used in making rigid boxes and canisters and in displays (see also *Fabricated Containers*, p. 584). They are an innovation of the past eight years, since rigid sheeting in continuous roll form in thicknesses of 0.005—0.030 in. became available.

The materials were developed to extend the advantages of clear, sales-getting transparency into box-like packages, bearing the same relationship to cellulose films that set-up boxes bear to paper bags or envelopes. The basic soundness of the concept was quickly proved, as the field grew at an exceedingly rapid rate during the years immediately prior to the war.

Each of the three main types of materials used in making rigid transparent packages has its individual characteristics; each is best suited for some condition of fabricating or use.

The oldest sheet material is *cellulose acetate* which is made in continuous rolls 30 in. wide and supplied both in that form and in cut-to-size pieces. The material in all thicknesses is clear, colorless, transparent. It is not completely moistureproof and some expansion and contraction occurs in time. This can be accommodated by proper selection of gauge and design.

Ethyl cellulose sheet is somewhat newer than acetate. Although generally similar, it has several advantages. The material is particularly well suited to drawing operations and some fabricators, although not all, prefer it for applications involving drawing. Because of low-temperature strength retention, it can be fabricated even after storage at low temperatures. Moisture resistance is somewhat superior to that of acetate.

Vinyl copolymer was first introduced for rigid packaging only a short time before the war and its eventual status has thus not been determined. Its drawing properties are excellent and it has very good moisture resistance, although it is not waterproof. Physically, it is somewhat tougher than the cellulose materials, although possibly not to a significant degree.

Transparent *acrylic* sheet materials, while not used for containers, are excellently suited to display fabrication. These sheets have unexcelled clarity and brilliance and have the property of edge-lighting. The surface may be embossed with lettering or designs, or marked in any of several ways. Counter or shelf displays for small merchandise may be created with eye-getting attractiveness and distinctive appeal. Acrylic sheets are particularly adaptable to display because they are readily fabricated without expensive molds or setups. The plastic softens when heated to about 200° F., and when in a soft state may be formed or bent into intricate shapes.

In discussing plastics as they are used for packages, it is necessary to consider the methods of manufacture which are available. More than one method can, of course, be used for the production of the same part, but generally speaking, when the type of material and package design are fixed, one method will stand out as superior to the others for the job at hand.

This chapter is concerned only with the rigid and semi-rigid forms of plastic packaging. Plastic films and coatings are fully discussed elsewhere in this book (see chapters on *Coatings*, p. 375 ff. and *Wrappings and Laminations*, p. 411 ff.).

Molding

There are four basic types of molding—compression, injection, transfer and extrusion. A brief general description of each is given herewith.

Compression molding is accomplished by the introduction of an accurately measured charge of molding material into a hot open mold, and the subsequent closing of that mold under pressure so as to form the charge to a permanent shape.

Generally speaking, only thermosetting materials such as the ureas, the phenolics and the melamines are molded by this process. Various fillers can be used for all of these materials, general purpose materials being filled with wood flour while for special applications, shredded canvas, string, mica, etc., can be used.

The finished product is to all intents and purposes inert and cannot be softened to any appreciable extent upon further application of heat.

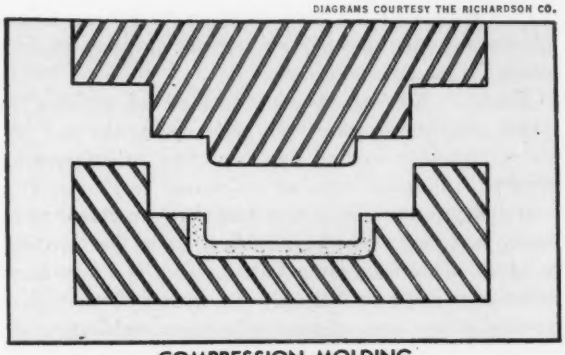
Injection molding is a technique for changing the plastic material from a powder to a flowing state at which time it is injected into a closed mold through suitable openings known as sprue, runners and gates.

The materials used in injection molding are generally thermoplastic. However, several companies have developed equipment which make possible the injection molding of thermosetting materials. One of these processes, *jet molding*, makes use of a special heating system which is installed on standard machines. Another method permits the continuous injection molding of thermosetting materials without this special equipment.

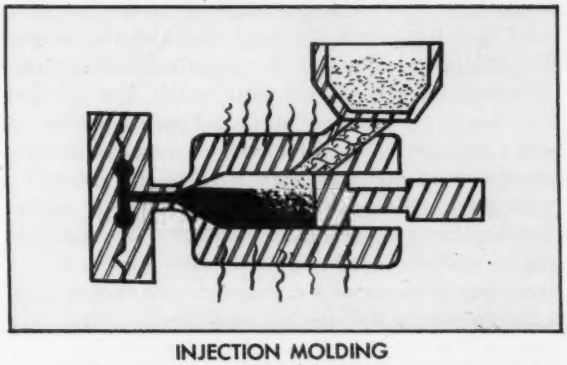
However, for packaging purposes, it is well to think of injection molding as a technique for such thermoplastic materials as cellulose acetate, cellulose-acetate-butyrate, ethyl cellulose, polystyrene, methyl methacrylate, vinylidene chloride and vinyl chloride-acetate copolymers.

Injection molding lends itself to faster cycles than compression molding, and therefore, although the basic raw material cost is generally higher, the finished piece price can be equal to or lower than that for thermosetting parts made by compression. However, since price is affected by so many variable items, it is well not to expect that all

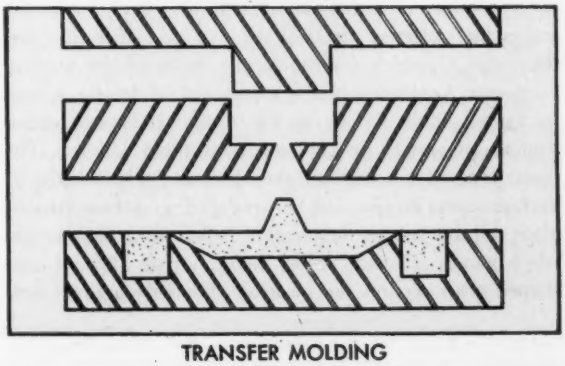
DIAGRAMS COURTESY THE RICHARDSON CO.



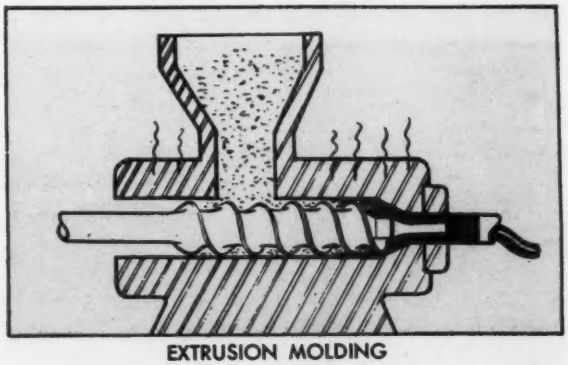
COMPRESSION MOLDING



INJECTION MOLDING



TRANSFER MOLDING



EXTRUSION MOLDING

injection molded parts will be cheaper than compression.

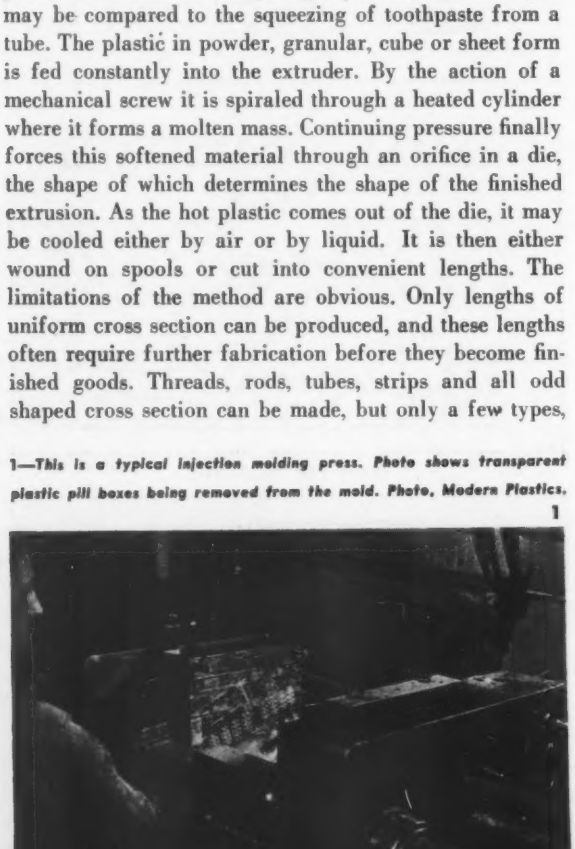
Articles identical as to shape and size may be produced by either compression or injection molding, the only difference being in the properties of the material used. In other words, it is proper to design a razor box which may either be compression molded from thermosetting materials or may be injection molded from thermoplastic materials depending upon the property requirements for the finished article.

Transfer molding—Another method of molding in which great strides have been made during the past few years is transfer molding. By this process, a thermosetting material (phenolic, urea or melamine) is subjected to heat and pressure and is then forced into a closed mold cavity and cured therein. In effect, it is the injection molding of heat-hardening materials, but it differs from injection molding in that only one charge of material is handled at one time, whereas in injection molding a continuous reservoir of material is being preheated and held in readiness at all times. One advantage of this method of molding is that due to the ease with which the material fills each cavity, no sudden and excessive strain is placed upon weak projecting mold parts or thin insert-holding pins. Heavy, thick sections of molded parts are filled out with a completely softened homogenous mass of molding material. Cure cycles for thick sections are reduced.

Extrusion molding—Continuous extrusion of plastics provides almost uninterrupted production. The technique may be compared to the squeezing of toothpaste from a tube. The plastic in powder, granular, cube or sheet form is fed constantly into the extruder. By the action of a mechanical screw it is spiraled through a heated cylinder where it forms a molten mass. Continuing pressure finally forces this softened material through an orifice in a die, the shape of which determines the shape of the finished extrusion. As the hot plastic comes out of the die, it may be cooled either by air or by liquid. It is then either wound on spools or cut into convenient lengths. The limitations of the method are obvious. Only lengths of uniform cross section can be produced, and these lengths often require further fabrication before they become finished goods. Threads, rods, tubes, strips and all odd shaped cross section can be made, but only a few types, notably wire coverings, are ready for action when they leave the extruder.

1—This is a typical injection molding press. Photo shows transparent plastic pill boxes being removed from the mold. Photo, Modern Plastics.

1





2

2—Top and bottom edges of a convolute cylinder of rigid sheeting can be beaded simultaneously in equipment like this. Photo, Eastman Kodak Co.

Until very recently, only thermoplastics had been employed with this form of molding. However, a new machine has been produced which will continuously extrude thermosetting materials. At the time of writing, tubing 5½ in. wide, with ¼ in. wall section, has been produced along with various other smaller sections. A refinement of the screw feed is employed in this machine with the addition of a set of baffle gears which, meshing with the flights of the screw, help to raise the pressure to the required level for thermosetting extrusion.

Continuous extrusion would be indicated for the production of material where the section was continuous.

Fabrication from sheet

Plastics in sheet form, usually transparent, are generally made into containers by either the *set-up* method—cementing or sealing several cut pieces together—or the *drawing* method, in which the sheet is molded in a single operation in dies under heat and pressure. A third method developed during the war is that of spirally winding thin sheet from a roll to form tubular containers which may be either round or semi-square. Such tubes can be wound in a single layer with a lap joint or in multiple layers with butted joints, using the same machinery which is used to produce soda straws or spiral paper containers.

Semi-automatic equipment was developed before the war for the fabrication of set-up containers, and several machinery companies are working on fully automatic methods. A fully automatic machine for drawing small containers at high speed is being used on war work and will be available postwar.



3

3—*Machine for creasing blanks of rigid sheeting to form rectangular set-up boxes. Joints are cemented with solvent. Photos, Eastman Kodak Co.*

The fabrication of containers from sheet is further discussed under the heading *Fabricated Containers*, p. 584.

Casting

Phenolic materials may be cast with relative ease and the castings have excellent machining properties. For these reasons, the process of casting is sometimes useful in the packaging field for the manufacture of small tubes, small boxes, closures, etc.

The majority of such cast parts are produced in straight draw molds. First, a steel dipping arbor or mandrel is machined to the specifications of the finished casting and attached to a funnel plate and handle. Next, the mandrel is dipped into a pot of molten lead which flows up the sides of the steel and cools on removal from the pot. It is then stripped from the arbor, thereby producing lead mold with one end open. Obviously no undercuts can be designed into a straight draw casting of this type. Flutes, scallops, beads and other design accessories must run in the same direction in which castings are to be taken from the mold.

Split molds, although more expensive both as to mold costs and finished piece price, are sometimes used. Undercut designs may be incorporated into articles produced from this type of mold.

No matter what type of mold is used, it is filled with resin in approximately the same manner. The liquid casting resin is first mixed in a large kettle. It is then drawn off into smaller containers, after which it is poured into the open cavities of the lead molds by hand. After the molds are completely filled, they are placed on racks and carried into curing ovens. The temperature in these ovens is very carefully controlled. The length and temperature of cure varies according to the grade of material used as well as the thickness of the casting. After allowing sufficient time for curing, the filled molds are removed from the ovens and the castings driven from the molds by means of an air hammer or by other methods. The lead molds are then remelted and the entire process repeated.

As a general rule, parts made by the casting process are subjected to more machining operations than so-called molded parts which are produced by compression or injection molding. Cast phenolic material, however, is very amenable to any type of machining operation and can be given a lustrous finish by buffing or tumbling.

Lamination

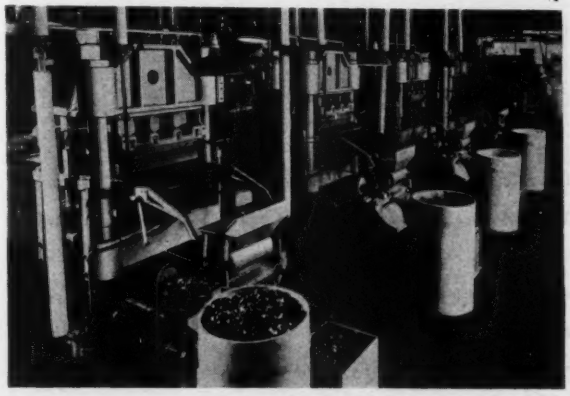
Another group of plastic materials which can be employed for packaging application includes the resin-impregnated laminates. To form them, cotton duck, paper, wood veneers and other materials are impregnated with resins and then molded into flat or formed objects. For the molding, high, low or contact pressure methods may be used, the choice of method depending upon the amount of pressure required to shape the particular object and to cure the resin which is selected for the laminating. A rough rule of thumb would indicate that the higher the pressure, the stronger and more water resistant the molded object, although this might not apply in all cases.

Laminated materials may also be rolled to form tubular sections for packaging use. The material may be impregnated with the resin before rolling, or the resin may be applied during the rolling operation. This process will produce strong and serviceable objects the properties of which include a minimum of water absorption.

Metal plating

Beauty and serviceability can be added to plastic closures or containers, made by any of the molding methods, by plating them with one of many available metals. For example, copper, silver and gold are readily available for this process. Normal plating methods are followed quite closely save that a patented chemical dip is necessary in order to make the surface of the plastic conductive. Once this condition has been reached, however, normal plating operations ensue.

4—*Plastic bottle closures are automatically molded by compression method in batteries of high-speed presses. Photo, Boonton Molding Co.*



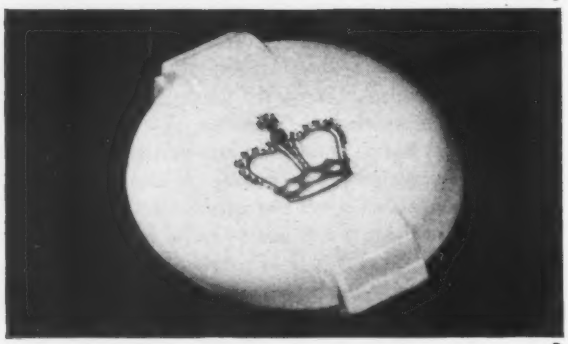
4

Molded containers

by George F. Brown



1



2



3



4

1—Injection-molded lipstick case of Lumarith has unusual gear action. 2—Two-piece rouge case has plastic hinge. Decoration is gold roll-leaf stamping. Molded by Bernard Edwards. 3—Urea base with cover makes colorful utility jar. Photo, Plaskon. 4—Jewelry cases of urea with patented spring hinge. Decoration is wiped in, gold or color. Photo, Rathbun.

In planning a molded plastic container for jewelry, cosmetic, industrial or other use, the packager, having turned to plastics, should first of all consider just what is to be expected of that container. Will it be treated with the consideration shown a fine watch or ring—or will it have to withstand severe usage, rough handling and shock? Must it resist undue heat, moisture, acids or alkalies? And what about color or transparency?

There are two distinct classes of materials—thermosetting plastics and thermoplastics. To some extent the general characteristics of these two classes will help to narrow the choice, but among the three widely used thermosetting materials and the half-dozen most useful thermoplastics there will be found literally thousands of different molding formulations.

From this large and growing family of materials, the experienced molder will select the one compound and the one molding method best suited to the container job at hand—whether it be a large, rough-and-tumble type of container or the smallest precision case carrying close tolerances. But it is desirable that the packager have his own background of information. For a description of molding methods, see p. 597. Materials are discussed in general in the article, *Plastic Materials Used in Packaging*, p. 575. Here, we will consider material characteristics particularly applicable to molded containers.

The thermosetting compounds resist heat and moisture and enjoy the enviable reputation of being ideally adapted for almost any type of container (exclusive of transparency) that merchandisers may desire. One very fine attribute of thermosetting materials is the advantage of being able to electroplate metals on portions of molded pieces for the enhancement of design, without detrimental effect from immersion.

Investigation of properties and characteristics of the various thermosetting groups shows that the phenol-formaldehydes, with their broad band of general purpose and semi-impact mixes, have from two to four times the impact strength of other thermosetting plastics.

Phenol-furfural properties and characteristics are similar to those of the phenol-formaldehydes except for somewhat superior molding qualities where extensive transfer operations are employed. This may not seem important to the packager, but from a standpoint of piece rate it does become important in the final analysis when the packager comes to pay for his molded containers.

With the urea-formaldehydes we find an extensive thermosetting field unexcelled for its ability to mold sturdy, lightweight containers. It provides an unlimited source of non-bleeding color material that is light-fast, odorless, tasteless and resistant to heat, moisture and organic solvents. Its hard surface and lustrous finish make it ideal for any item from a jewel case to office equipment.

The melamine-formaldehydes represent another ther-

mosetting group having good physical properties and characteristics. They, too, are odorless, tasteless and inert —resisting hot water, organic solvents, weak acids and alkalies. The melamines have a considerable color range. As a container material they should have far-reaching possibilities in the medical field.

Thermoplastics generally are limited in their resistance to moisture, although recent development has corrected that situation to some degree. As a general rule, the thermoplastics are found to be strong, tough and elastic. Furthermore, they can be made capable of withstanding quite severe impact. But their outstanding attribute making them attractive to merchandisers is clarity. Because of their transparent composition, they may be mixed with color pigments to any shade of translucency desired, thus furnishing a marvelous setting for actual full view or tinted display of merchandise within covers.

Cellulose acetate stands out very conspicuously for ease and speed in molding as well as sturdiness and ability to withstand fairly high impact even at thin container-wall thicknesses. This material in containers is exceedingly beautiful in its irridescent finish created by the introduction of mother-of-pearl or onyx substances.

Cellulose acetate butyrate is a later development of the acetates with better resistance to moisture and improved dimensional stability. Certain grades of this material are understood now to stand short durations of boiling and are found to be considerably tougher than the regular cellulose acetates. Better wearing and weathering qualities are now possible with this newer material.

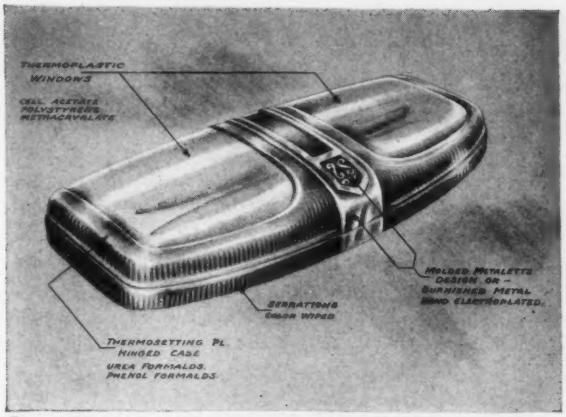
Ethyl cellulose moldings have unlimited clarity and color possibilities with low-temperature flexibility, good impact strength and resistance to water and alkalies.

Polystyrene materials possess unusual and rare properties unmatched by most plastics. Rapidly increasing in use, they are practically impervious to moisture; they maintain their physical strength at extremely low temperatures, and they have excellent crystal clarity. They are exceptionally resistant to acids. They are found to be frequently employed in reflecting light beams through their color-tinted structure, thereby producing a natural, vivid edge glow comparable to artificial lighting.

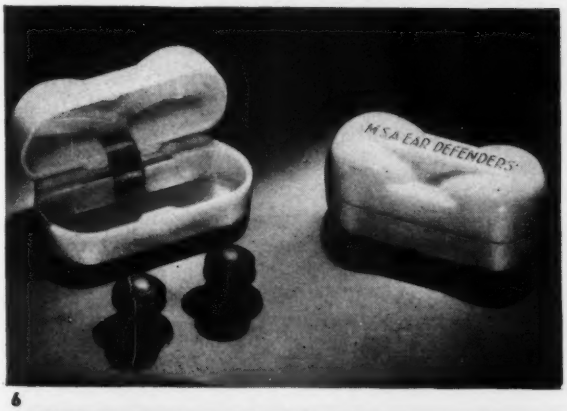
The acrylic resins compounded into polymethyl methacrylates are valuable for their pure, crystal clarity.

Vinyl resins are compounded into many forms of materials. This highly endorsed plastic will not swell from immersion and has great rigidity in small cross section areas where numerous inserts must be held. It is one of the newer materials, with tremendous possibilities in store for it upon conclusion of the war.

With a vast assortment of plastic materials based on these general types to choose from, packagers at the close of the war will be able to obtain specialized containers to fit every need and occasion. Boxes molded from both classes of materials—thermosetting and thermoplastic—will be entirely possible, thus providing rigid dimensional stability together with window transparency for display purposes. Colored plastic inlay work will make its appearance. Burnished and antique metal trim, as well as metalette design, will play many interesting decorative roles.



5



6



7

5—Illustrating design, decoration and material possibilities in a molded box for pen set. Drawing, Plastic Engineering & Development Corp. 6—Ear stoppies are encased in lightweight, durable Beetle urea, making a permanent carrying case. Molded by Rathbun. 7—Plastic lends itself to unusual shapes and effects. This container for eggnog shampoo dramatizes the product; cork closure is concealed when "egg" is inverted. Material, Lumarith; injection molded, Universal Plastics Corp.

Fabricated containers

by David S. Hopping

Before 1942, the case for rigid transparent plastic containers was summed up in a single word—glamor. Consumer merchandise wrapped in such packaging commanded a considerably higher price and clinched the sale for the growing number of self-service impulse buyers. Glamor, however, was not the objective of the armed forces when they requisitioned millions of rigid plastic containers of varying sizes and shapes. Their reasons were very basic: savings in weight, rapid and economical production, speedier distribution made possible because package contents were instantly identifiable, protection against water and grease as well as protection against the elements and the many shipping hazards encountered.

In the postwar market, the glamor sales appeal of transparent packaging will again be a major factor, but in addition there will be a large market for the functional or protective type of transparent plastic container.

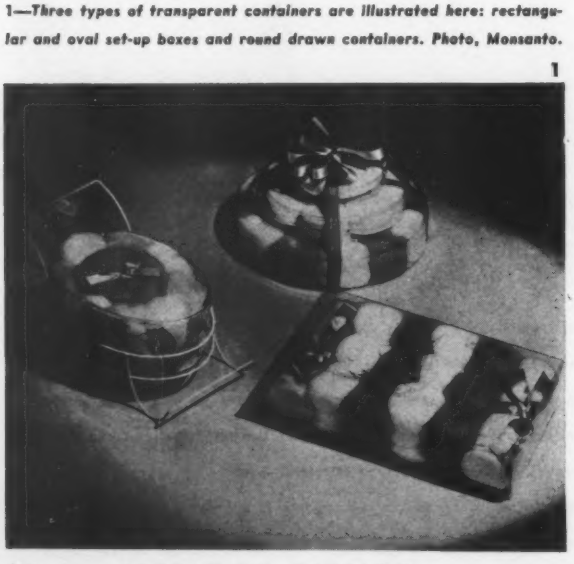
In considering fabricated transparent containers for use in postwar consumer and industrial packaging, it might be best to review the materials best suited for them together with the three basic types and the respective advantages of each.

The two principal materials used are cellulose acetate and ethyl cellulose in clear transparents and tints, although for containers of this type any semi-rigid transparent plastic film in thicknesses between 0.005 in. and 0.020 in. can be used. In actual practice, the cellulose acetate is the preferred material for general use. However, because ethyl cellulose is slightly tougher though less rigid, it is frequently selected for the more difficult drawn containers.

There are now three kinds of fabricated rigid transparent containers: the drawn container, the set-up box, and the spiral, each of which we consider separately.

1—Three types of transparent containers are illustrated here: rectangular and oval set-up boxes and round drawn containers. Photo, Monsanto.

1



The drawn container

Drawing consists basically of transforming a two-dimensional sheet into a three-dimensional form by means of dies in a drawing press, under heat and pressure. It is important to note that sufficient material flow takes place in drawing so that the wall thickness of the finished piece is uniform and approximately that of the original stock.

Shapes made by this process are frequently used as lids for containers made by other means, though they are by no means limited to this application. Cosmetic containers and powder puff boxes were made by this method before the war. Very frequently drawn parts are used in combination with other materials as, for example, cardboard tubes and boxes.

Until recently, the standard method of drawing was to hand feed precut blanks into a heated drawing die, mounted in a hand press, a kick press or a power press. If the plastic was medium or heavy gauge, the blanks needed preheating. Usually the cutoff was incorporated in the drawing die, but sometimes it was accomplished in a subsequent operation. By this method the average production rate was approximately 8—10 pieces per minute. More recently, automatic feeds were developed for the hand and power presses. Strips or reels of plastic films were thus fed automatically to the heated die after being preheated by passing over hot plates. This improvement speeded the production rate to approximately 18—20 pieces per minute.

During the war, a high-speed automatic plastic drawing press has been developed. A battery of these new cam presses has been in operation for more than two years. They are fully automatic, feeding reels of plastic film over preheated plates to heated dies. The production rate, which is at present 50—90 drawn pieces per minute, is expected to be increased. The Celanese Plastics Corp., which developed the machine, has licensed a large manufacturer of packaging machinery[1] to build and market these new presses so that the entire industry may benefit from the reduced production costs resulting from the development of this equipment.

The set-up box

The second type of fabricated rigid transparent plastic container is the set-up box. It may be all transparent plastic or it may be a combination of plastic and cardboard or any other materials. The construction is not difficult and lends itself to almost any product that can profit by visual display.

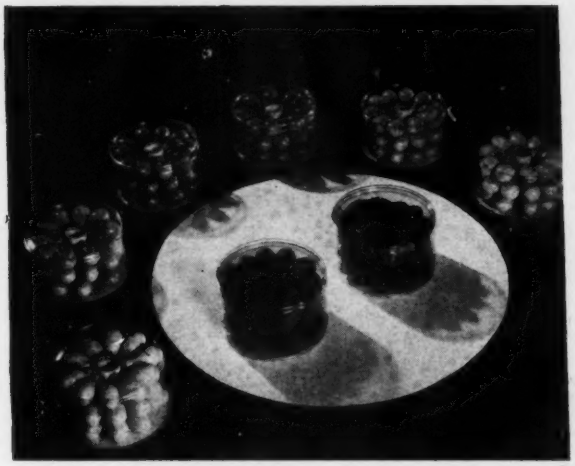
To construct a transparent plastic set-up box, blanks are die cut and then creased with a heated creasing bar or die. The creased blanks are next folded around a mandrel and cemented by hand. The only equipment needed is a hand or power press for blanking and creasing and a

[1] F. L. Smithe Machine Co., Inc., New York City



2

2—*Labels show through these cigar canisters, with metal humidifier tops and metal bottoms. Made by Geo. V. Clark Co. Photo, Monsanto.*



3

3—*A new merchandising idea: face cream in single-use capsules, shown in transparent boxes. Made by Hygienol Co., Inc. Photo, Monsanto.*

cementing mandrel. One machinery manufacturer, however, offers a semi-automatic creaser which is considered to be more efficient and offers greater speed than the press creasing operation.

Several machinery companies are reportedly working on semi or fully automatic equipment to produce set-up boxes and it is possible that this new equipment will be available soon after the war.

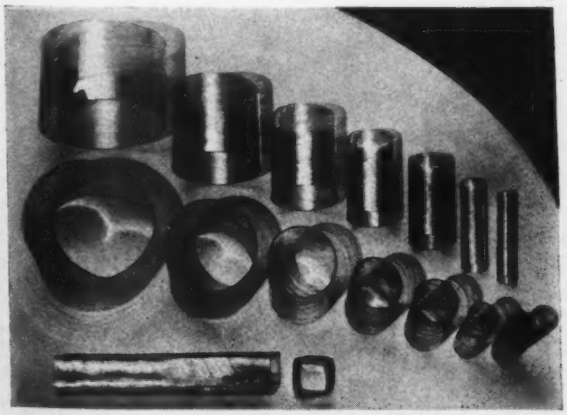
One of the earliest and simplest forms of the fabricated or set-up type of construction is the convolute-wound cylindrical container. This type of rigid transparent package was popular for powder puffs, candy and dozens of other items in the prewar market. The construction is completed in four simple steps. First, a blank of the correct size is wrapped around a mandrel and the overlapped edge cemented with a solvent. The top and bottom of the resulting cylinder are then beaded by means of a heated beading die. Next a die-cut bottom of plastic or cardboard is supported by (and sometimes cemented to) the bottom bead. Finally, a drawn transparent plastic cover is used as a closure.

Automatic continuous straight-edge beading equipment has now made possible the development of an inexpensive type of set-up box, the fabrication of which lends itself easily to quantity production methods. In this method, one or both edges of a strip of the proper gauge and width of plastic sheet is run through a straight-edge beader. The strips are then creased across the beads and cemented into the shape of the side walls of the container desired, as for example, cylinders, rectangles, heart shapes, triangles, etc. Next, a bottom is die-cut to the exact size of the container. While it can be made of plastic, this bottom is frequently of rigid cardboard since there is no advantage in transparency here. This bottom, which fits tightly, is pushed into position by hand and is supported by the bottom bead on the side wall. It may or may not be cemented.

The cover, if it is not of a drawn construction, can be made exactly the same way except that the die-cut piece is always transparent and the lower edge of the lip is usually left unbeaded.

A smooth, round, beaded edge can also be applied to

4—*New spiral-wound tubes come in assorted diameters and shapes, cut to length and capped to form practical packages. Photo, Celanese.*



4

5—*Lids of these decorated containers are drawn; side walls convolute formed and beaded top and bottom; bottom piece is tin. Photo, Celanese.*



5

PROPERTIES OF PLASTIC SHEETING USED FOR RIGID CONTAINERS*

Properties	*Vinylite*	*Ethocel*	*Eastman Acetate Regular*	*Eastman Acetate Rigid*	*Lumarith*	*Vuepak*
GENERAL INFORMATION						
Manufacturer	Carbide and Carbon Chemicals Corp., New York, N. Y.	Dow Chemical Co. Midland, Mich.	Eastman Kodak Co., Rochester, N. Y.	Eastman Kodak Co., Rochester, N. Y.	Celanese Celluloid Corp., New York, N. Y.	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Chemical type	Vinyl chloride-acetate resin	Ethylcellulose	Cellulose acetate	Cellulose acetate	Cellulose acetate	Cellulose acetate
Forms available	Sheets 50 by 20 in.	Sheets and continuous rolls	Clear and translucent sheets	Clear sheets only	Sheets and continuous rolls	Sheets and continuous rolls
Thickness range, in.	.005 to .250 by .005 steps	.003 to .020	.003 to .020	.003 to .020	.003 to .020	.005 to .020
Area factor for .005-in. gage, sq.in. per lb.	4,000	4,800	4,250	4,150	4,100–4,200	4,189
Maximum width of continuous rolls, in.	....	25	40	40	42	32
Specific gravity at 25° C.	1.33–1.45	1.14	1.28	1.31	1.32–1.30	1.25–1.30
MECHANICAL PROPERTIES						
Tensile strength, lb. per sq. in.	8,000–10,000	10,000	7,500–11,000	6,800–11,500	6,500–11,000	7,000–11,000
Elongation, %	5	30–40	30–40	26–32	25–40	25–50
Bursting strength (Mullens test), lb. per sq. in.	..	112 for 0.003-in. gage	90 for .003-in. gage	90 for .003-in. gage	290 for 0.010-in. gage	150–350
Tearing strength (Elmendorf), grams per mil	5.6	.....	.....	.....	16.5	11–26
Folding endurance (M. I. T.), cycles	...	40–150 for 0.020 to 0.003-in. gage	8–45 for .010 to .003-in. gage	8–45 for .010 to .003-in. gage	10 for .010-in. gage	8–56 for 0.010 to 0.003-in. gage
THERMAL PROPERTIES						
Coefficient of expansion, 10^{-5} per ° F.	3.9 (32° to 120° F.)	6 (15° to 110° F.)	5.1	6.0	6–9	5.6–8.9
Thermal conductivity, 10^{-4} cal. per sec. cm. ° C.	3.7	5.6	...	...	4.5–7.8	4.5–7.8
Heat distortion point, ° F.	135–155	130–220	...	...	.....	130–212
Forming temperature, ° F.	195–265	0–275	225	250	225–275	225–275
CHEMICAL PROPERTIES						
Water absorption, % in 24-hr. immersion at 25° C.	0.05–0.15	3.0	4.9	5.2	4	1.5–3.0
Dimensional change after 24-hr. immersion in water, %	0.05 (6 weeks)	1.0	1.4–1.7	1.2–1.4	0.75–1.0	0.8
Loss in weight after 24-hr. immersion in water, %	None	None	.....	.....	0.15	Nil to 0.2
Water-vapor permeability (0% to 100% R. H.) g./m.²/24 hr.	30 @ 30° C. for 1 mil film	200 @ 30° C. for 0.010-in. gage	110–160 @ 40.5° C. for .010 to .003-in. gage (0% to 90% R. H.)	110–160 @ 40.5° C. for .010 to .003-in. gage (0% to 90% R. H.)	75 @ 25° C. for .010-in. gage	50–145 @ 25° C.
Resistance to weak acids	Excellent	Excellent	Gradual hydrolysis	Gradual hydrolysis	Fair	Fair
Resistance to strong acids	Excellent	Decomposes	Decomposes	Decomposes	Decomposes	Decomposes
Resistance to weak alkalies	Excellent	Excellent	Gradual hydrolysis	Gradual hydrolysis	Fair	Slight attack
Resistance to strong alkalies	Excellent	Excellent	Decomposes	Decomposes	Decomposes	Decomposes
Resistance to greases and oils	Excellent	Excellent	Excellent	Excellent	Depends on type	Varies with type of grease or oil
Resistance to organic solvents	Resistant to alcohols; soluble in ketones and esters; swells in aromatic hydrocarbons	Soluble in most common solvents	Softens in alcohols; soluble in ketones and esters; insoluble in hydrocarbons	Softens in alcohols; soluble in ketones and ester; insoluble in hydrocarbons	.....	Softens in alcohols; soluble in ketones and esters; insoluble in hydrocarbons.
PERMANENCE PROPERTIES						
Resistance to light under indoor conditions	Slight yellowing after prolonged exposure	Excellent	Good	Good	Good	Good
Resistance to low temperatures	Flexibility decreases	Excellent at —50° F.	Good	Good	Satisfactory	Satisfactory at 32° F.
Resistance to high relative humidity	Excellent	Slight swelling	0.2 to 0.4 per cent expansion	20% to 70% R. H.	Swells	Swells
Flammability classification	Non-flammable	Slow burning	Slow burning	Non-flammable	Slow burning	Slow burning

* From manufacturers' figures and data.

cylindrical containers, whether they be spiral or convolute wound, as well as to drawn covers of other drawn containers. This is done by means of a heated beading die. Semi- or full-automatic machines have been designed and built, and there is at least one packaging machinery manufacturer who offers a standard model.

It must be pointed out that, aside from the decorative finish beading provides, there are two very specific benefits to be derived from it: first, beading gives strength and rigidity to the container; second, its smooth finish guards against the snagging of merchandise contained within it, as for example hose, fabrics, yarn, wool, etc.

The spiral package

The transparent plastic spiral container is one of the new developments of the war. In principle, its construction is that of the ordinary spirally wound soda straw. Plastic spiral tubes, however, come in a variety of pliés. You have a single-ply tube, wound so that there is a slight overlapping which is automatically cemented, or 2—5 plies, or even more, may be so wound that the center of each succeeding ply is directly over the butted joints of the previous ply, thereby resulting in an extremely rigid, tough tube. Made this way, 2 plies of 0.005 in. are stronger than a single ply of 0.010 in., and 4 plies of 0.005 in. are much stronger than 2 plies of 0.010 inches. Most spiral packages start from a cylindrical tube. One producer, however, offers a variety of rectangular shapes.

Among the advantages of this kind of rigid container is the fact that it is produced in continuous lengths at great speed, in a variety of diameters, on machinery easily adapted from paper tube or soda straw winding. A travelling automatic cutoff knife fitted to the machine moves along with the tubing so that the cut is clean and at a sharp right angle to the length.

Spiral packages are functional packages. While they do not have the clear transparency of the two other types, they do provide good visibility and are well suited to applications where protection, identification, and light weight are the principal requirements.

War uses include millions of ammunition components wound at high speed, to be rapidly filled with explosive powder. Delicate carburetor parts have been shipped in such spiral containers, beaded and sealed at both ends to secure against tampering. Very pistol flare cartridges and delicate springs are similarly protected. Postwar, these same containers in varying diameters will hold screws, bolts, nuts, toothbrushes, flowers watch parts, paint brushes, drafting instruments, typewriter ribbons, small machine parts, welding rods, and hundreds of similar articles.

These, then, are the three basic types of fabricated rigid transparent plastic containers. By making himself familiar with their characteristics and working with the fabricator and the plastic material supplier, the designer or user of packages can select a container that will provide the protection utility and sales appeal which he desires for his product.

The materials may be printed or decorated by any of a number of methods—letterpress, lithography, roll leaf stamping or embossing—and all these methods are used. (See *Printing on Plastics* p. 594.)



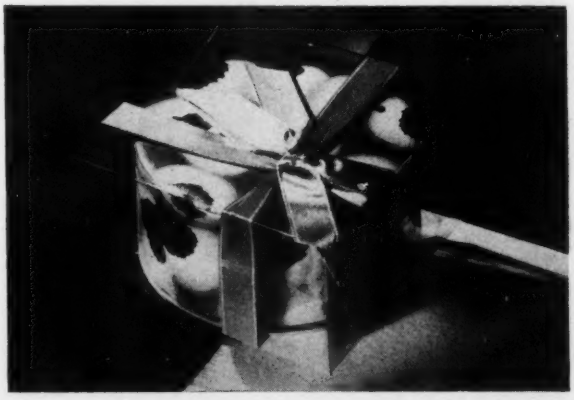
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6—Slim cylinders of cellulose acetate, effectively printed, help sale of girdles. Fabricated by National Transparent Box Co. Photo, Monsanto.

An important field of use for these materials is in store displays. In many cases, original containers are designed to combine visual selling on counters or shelves with a high degree of protection. In others, one out of ten of every unit packaged is in a rigid transparent container which is displayed and refilled as sold. Some merchandisers have used this means to get their product out from under counters and were able to change their whole merchandising practice, with marked results in sales increases. It is desirable to plan and design a transparent package as a display, in order to take full advantage of the proved appeal of transparency.

7—Typical square set-up box, adding glamor to a cosmetic product. Box is valued by the consumer for its re-use possibilities. Photo, Celanese.

7



Flammability classification

* From manufacturers' figures and data.

Semi-rigid seamless vials

by Herman Lermer



1



2



3

1—*With molded nozzle, flexible vial becomes drop-at-a-time oil can. Photo, Celluplastic Corp.* 2—*Fish lures, files and pills, with metal or plastic threaded closures. Photo, Lusteroid Container Co.* 3—*Purse- and home-size opaque-labeled vials for tablets. Photo, Lusteroid Container Co.*

Numerous commodities—including a great variety ranging from hardware and sporting goods to drugs, pharmaceuticals and novelties—are now being packaged in the seamless, resilient, vial-shaped plastic containers, which have certain basic advantages.

Inherently shatterproof, these containers survive accidents of packaging, handling or use which would ruin breakable containers, or cause the contents to be discarded or wasted.

Manufacturers of hardware items such as files and bits are increasingly using plastic vials. Obviously, where tools are stocked or sold, there are keen edges and sharp points that would nick if promiscuously spread in an unpackaged state, but if such tools are packed in container types that are not transparent, their visible appeal is lost. In the plastic vial, they can be seen without being handled.

The plastic vial is not a package intended to be discarded after it has carried the product into the possession of the buyer. Its transparency and durability are particularly advantageous when it is used as a storage container throughout the lifetime of use of items—such as files, bits and fish lures—which must be selected visually. Consequently, such industrial products as diamond drills, precision gauges, taps, dies, watch parts, and the smaller parts for business machines and instruments, as well as surgical and dental instruments, are now using the vials.

Labeling matter may be applied directly and permanently upon the container in process of manufacture. This labeling may use any or all colors, and combines trademarking, description, directions for use, etc. High eye-value may be achieved by applying a background color contrasting to the color of the type matter. If desired, labeling may be limited to a band around the vial. The indelible labeling advertises the product throughout the life of the container.

Vials of this type may be used to dispense viscous or powdered commodities and oils by utilizing an atomizing nozzle and expelling the desired amount of the product by simple, finger-tip pressure on the sides of the vial. An example of this is the oil container, supplied to the U. S. Navy, which permits the application of a single drop.

Seamless plastic containers are available in diameters from $\frac{3}{8}$ in. to $1\frac{1}{2}$ in. and in any desired height up to approximately 9 inches. For such special items as bits, and some dental commodities, the ingenious adaption of a capsule-type construction allows heights up to 14 inches.

Seamless transparent or opaque plastic vials can be supplied with all the standard types of closures—cork, threaded metal or plastic closures, plastic capsule tops, dispensing caps, or dual-purpose closures which also serve as measurers of prescribed quantities. The vials are available in threaded, flush or beaded tops, with or without "shoulders" that streamline the closure with the walls. They can be round, square, hexagonal or octagonal.

Plastic closures

by L. Baron

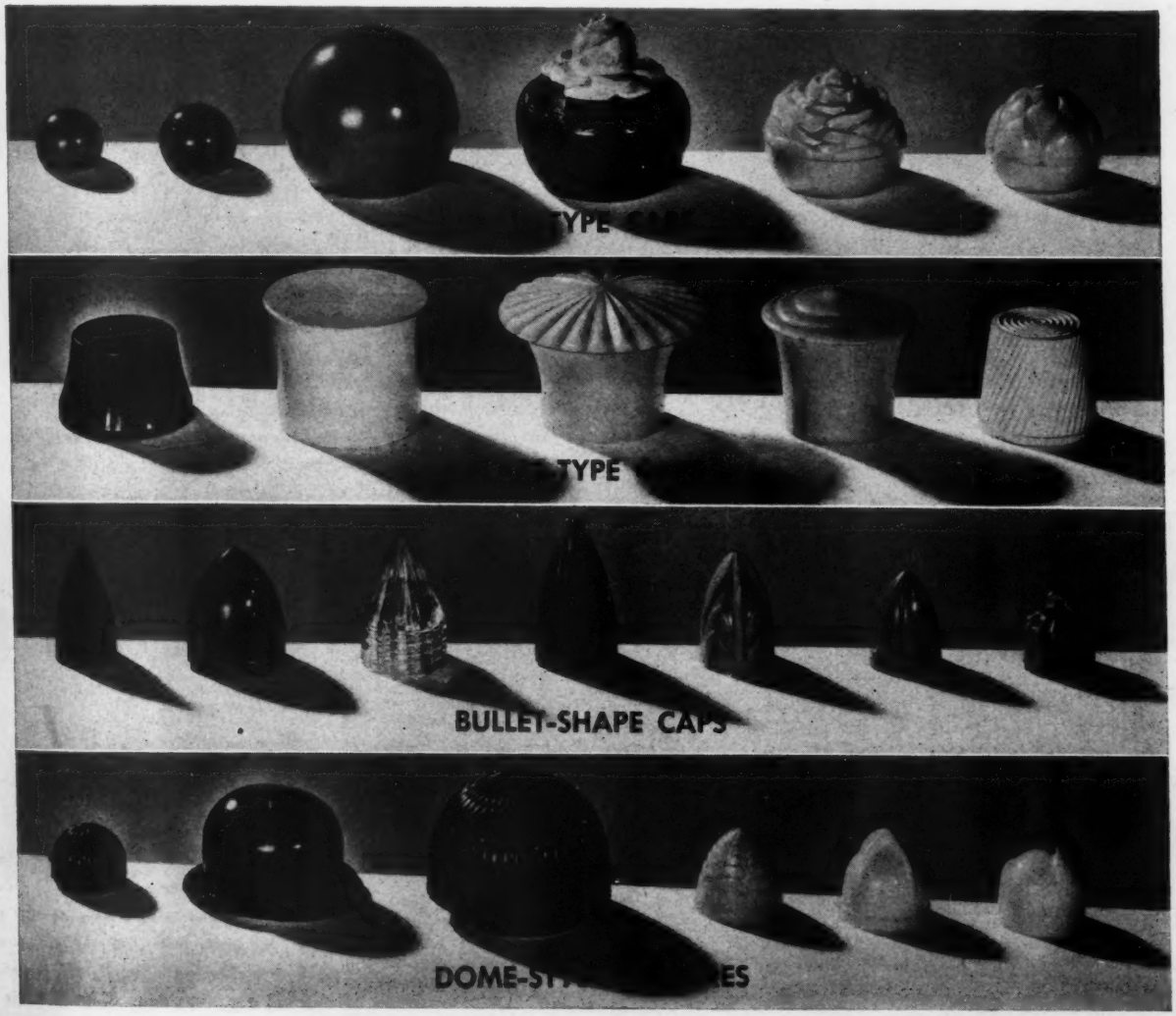
A good molded closure might be defined, simply, as one which preserves the contents and unscrews with a minimum of effort. It must be properly made from the correct material. The great bulk of closures are made of thermosetting plastics in compression molding machines.

Thermosetting materials are of two major types: phenol formaldehyde and urea formaldehyde. There are several other types, including melamine compounds, but their importance to the closure field is small. Closures made from thermosetting plastics can, with very few exceptions, be used for all types of products. In the few cases where trouble is encountered, a formulation which will hold the product can be furnished upon consultation with the powder manufacturer.

Phenolic materials are supplied in black, brown and a limited range of opaque colors. This type of cap should be tested for fading in sunlight and the possibility of bleeding when in contact with the product to be packed. Once the correct phenolic material has been determined, further testing is usually unnecessary. In testing, the molded sample should always be half immersed in the product and half exposed to the air to show the effects of oxidation.

Urea, second in quantity of plastic materials used for closures, is translucent and can be furnished in white and in an unlimited range of pastel shades. It is both light- and color-fast.

Thermoplastics, molded in injection machines, offer many types of clear mixtures and an unlimited range of transparent or translucent shades of color. Their use in the closure field, however, is limited by lack of an all-purpose material. Polystyrene caps have been used to hold some types of acids and, in a few cases, for cosmetics. One drawback for polystyrene is that it is subject to attack





1

1—*Plastic molded caps offer an exceptional opportunity for embossing or debossing trademarks and slogans. Such designs are popular for liquors.*

by most of the essential oils, although resistant to acids.

A thorough laboratory check should be made before using any thermoplastic material for a closure. These tests should cover every new run of caps as well as every new batch of the product to be packed.

There is occasionally a need to change the liner either because of the substitution of a chemical in the product, or because of a desire for lower costs, or because of inability to obtain the type of liner which had by past experience proved satisfactory. Before using a new liner, thorough laboratory tests should be made. Small quantities should then be placed upon the market to determine whether the package stands up to the wear of shipping and to counter handling.

The glass industry has standardized sizes of closures into a few major divisions. These are known as Glass Container Association continuous thread, or C. T. finish. The most popular sizes and threads are illustrated in *Closures, Finishes, Liners, Seals* (p. 531).

Measurement tolerances for the cap and glass must be allowed as variables exist both in manufacturing and in the raw materials used. Caps may fit one bottle, but not another. This is no indication of the correctness of either cap or bottle. Stop-and-go gauges should be used to determine which is at fault.

Collapsible tube caps, made in six standard sizes, have been giving good service for many years.

Molded caps are ideal in designing for both utility and beauty. A knurl or other ornamentation along the side of the cap provides a combination which makes both tightening and unscrewing easy.

Rich designs may be engraved in either positive or reverse effect. The design can be hand-wiped for contrasting colors, giving the cap a rich dignity.

All plastic caps are made in multiple-cavity molds, the number of impressions made from one mold depending on the size of cap and pressure which the molding machine develops. Automatic molding machines which enable volume production at lower costs are available. This development has resulted in lower prices and an expanding market.

In developing private designs, it should be remembered that straight-sided caps require a new cavity or female portion of the mold. This is then used with the standard screw plugs or male plate. A closure which is ball shaped, flared or unusually formed requires both the screw plug and cavity plates.

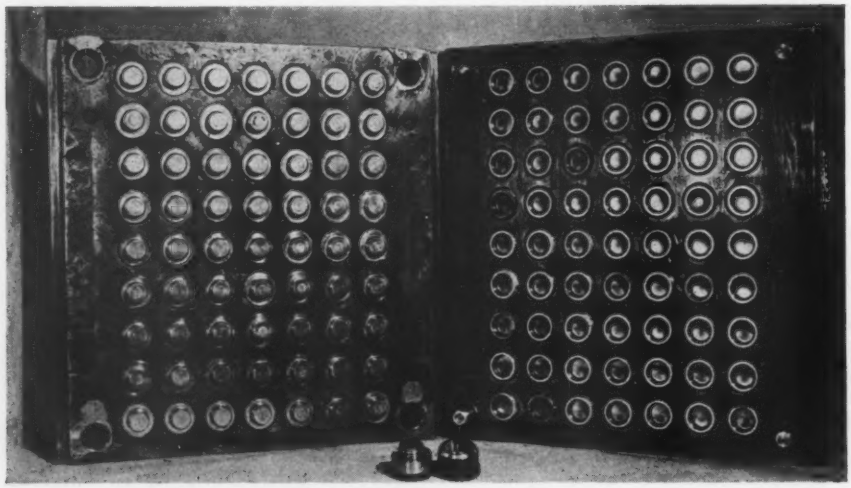
Special types of molded caps include such items as dropper, shaker, spray, dauber and many other forms of applicators and dispensers.

An interesting recent development has been a lug type of molded cap used on rouge box and cake make-up packages. With greater distribution, many other uses will no doubt be found, particularly in the packaging of dry materials.

Some sort of educational program is required to train the user to turn this type of cap sufficiently tight for the cover to be held firmly by the bottom. When this is not done, and the container is placed into a handbag or traveling bag, the package may open and damage articles with which it is packed.

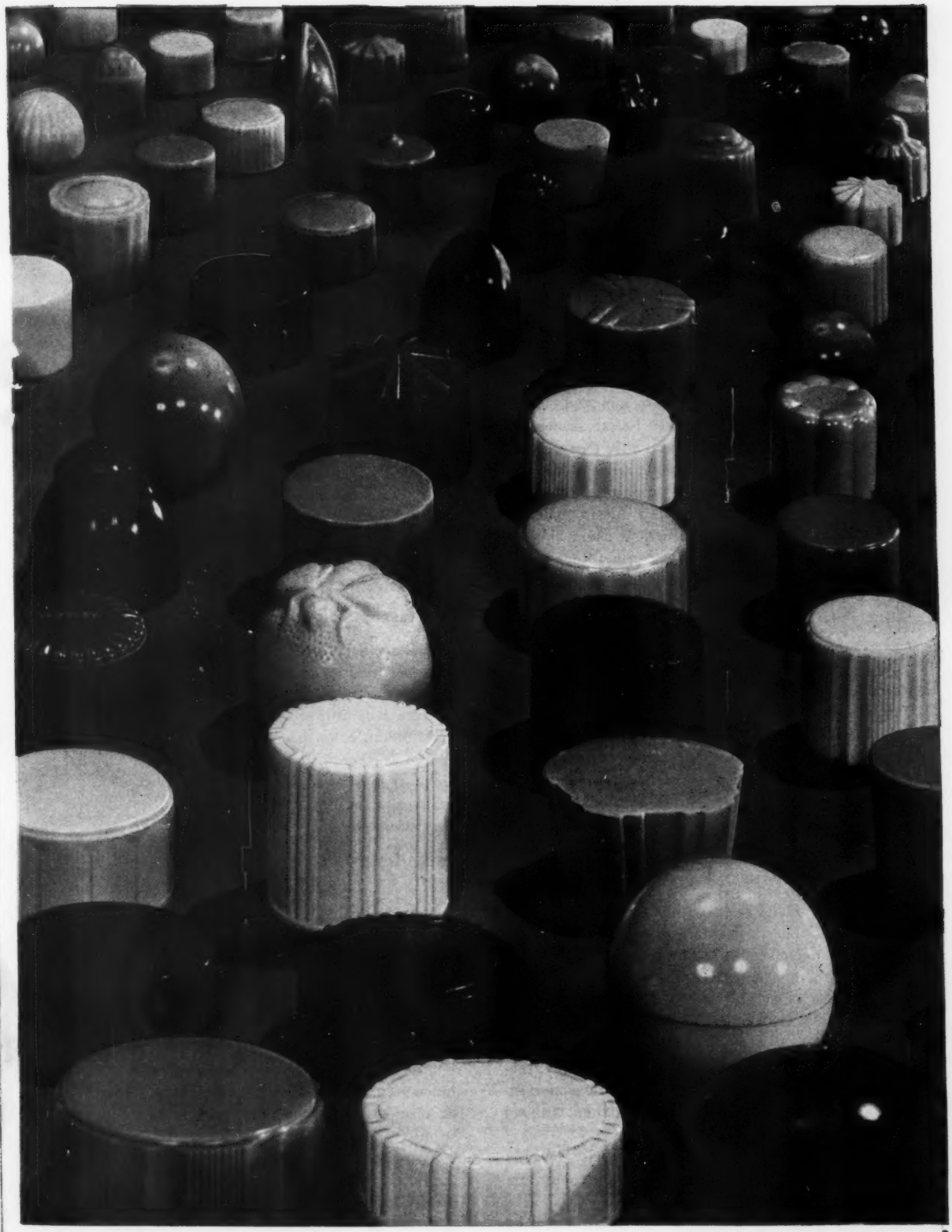
The package designer has such a broad field from which to choose in developing a molded cap, that the help of an engineer, familiar with plastic closure practice, should be used.

An important consideration in the use of a plastic closure is the pleasurable surface it provides and the smoothness of its threading in contact with glass or metal. For this reason, plastic caps are favored for containers holding drugs or toiletries.



2

2—*Close-up of a typical screw-plug compression mold in which closures are formed 63 at a time. At right is the cavity plate; left, the screw-plug plate on which threads are formed. Below, single screw plug and cavity.*



3

3—Aside from their other advantages, plastic closures are unrivaled in the opportunity they afford for use of clear, molded-through color, in every shade of the spectrum. Because they are integral with the material, colors will not chip off. Colors are usually chosen to match or harmonize with the label. Urea, with an unlimited range, is the great thermosetting color material. Color plates courtesy Plaskon Division, Libbey-Owens-Ford Glass Co.

Design suggestions for molded parts

For the economical production of molded parts, the package designer should understand those principles of plastic design which ensure maximum simplicity of the dies. Manufacturers of plastics have learned the "know-how" of designing through years of experience but since, in most cases, the product is designed and drawn up before being submitted to the molder, the following pointers will aid the package designer in specifying plastic parts which conform to standard practice.

Choice of material

The choice of the correct plastic material is as important as is the choice between cast iron and stamped aluminum to the designer in metals. Before drawing up the plastic part, it would be well to realize that materials are available which encompass a wide range of physical, thermal, chemical and mechanical properties.

Basically, there are only two types of plastic materials, thermosetting and thermoplastic. As their names indicate, the former sets hard under heat while the other softens under heat. Many variations and formulations are encompassed in these two general classifications, but the ability to blend compounds to meet definite requirements is generally essential only to the plastics manufacturer. The designer is not usually expected to be aware of the finer points, and it is safe to say that an intelligent material selection on general properties, in consultation with the plastics manufacturer, will be satisfactory.

Proper consideration of the material to be used should start with the general discussion of materials and properties under *Plastic Materials Used in Packaging*, (p. 575), and should include an examination of *Plastics for Packaging at a Glance* (insert chart, opposite p. 576), the detailed *Properties of Molded and Cast Plastics* (insert chart, opposite p. 596) and *Properties of Plastic Sheeting Used for Rigid Containers*, (p. 586). These descriptions and charts have been carefully prepared to include all the data normally applicable to packaging. If further information is desired, the outstanding authority is the PLASTICS CATALOG.[1]

The salient properties to be considered by the designer are:

1. *Mechanical and physical properties*—Specific gravity; hardness; modulus of elasticity; refractive index; tensile, compressive, flexural and impact strengths; machining qualities.
2. *Thermal properties*—Thermal conductivity, specific heat, thermal expansion, heat distortion point, resistance to heat.
3. *Chemical properties*—Effect of chemicals, effect of aging and sunlight, water absorption, burning rate.
4. *Decorative properties*—Range of availability as regards transparency and translucency, and also the range of colors which may be had.

[1] Published by Plastics Catalogue Corp., 122 E. 42nd St., New York, N. Y., $6.00

Selecting the method of manufacture

The product designer must be able to visualize the method of fabrication and the mold which will be needed to produce the part he is specifying. This visual concept is necessary in order to position inserts, locate the flash line, prevent undercuts, etc. He should be able to decide upon the technique of manufacture required for producing his part, to decide whether it is to be molded by using the compression, the injection, the transfer or the extrusion method.

Certain limitations are inherent in each method of molding. For example, a part to be made by injection molding is necessarily limited as to its total weight. Twenty ounces is a good maximum to stop at but, at the present stage of injection machine design, it is possible to go up to 2 pounds.

Tolerances

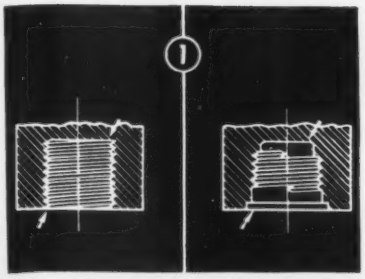
After material and molding method have been decided upon, it is well to investigate the maximum tolerances which can be allowed for each dimension of the part. The designer should always keep in mind the fact that the smaller his tolerances the higher the price. As a matter of fact, it is always well for the designer to place tentative tolerances on his part drawing and then discuss the matter further with his molder before requesting quotations. It may be that a close tolerance on one dimension of the part will make it a very difficult molding problem (see *Manufacturing Methods*, p. 579).

Design fundamentals

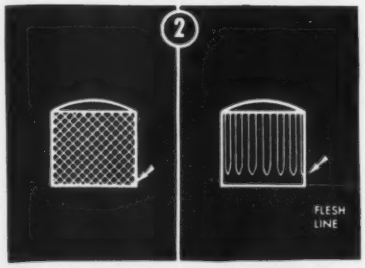
One general fundamental rule will greatly aid the designer of plastic parts. Simply stated, it is: "Throw away your T-Square and triangles and use nothing but your compass and French curve." This, in brief, means that curves and radii are simpler to mold than straight edges and sharp angles. Avoid uneven wall sections as far as possible. Heavy bosses designed on thin sections give an unsightly appearance to the thin section surface. Sunken letters cause a mold to be more expensive than raised letters. Large flat surfaces show flow marks and "dog skin" clearly. Always break such surfaces with lines or stipple.

These are just a few of the more important rules which apply to the proper designing of plastic parts. They merely indicate some of the many problems inherent in this type of work. Further suggestions are contained in the diagrams on the page opposite, and additional information will be found under *Molded Containers*, p. 582, *Fabricated Containers*, p. 584 and *Plastic Closures*, p. 589.

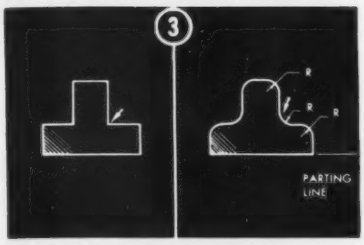
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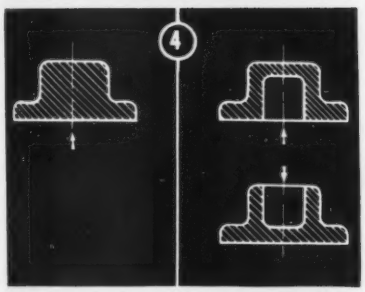
1—*Molded threads should begin and end abruptly. Make holes extending below molded threads smaller than the root diameter to permit pin removal. Provide a counterbore to eliminate flash at threads. Carry major diameter down from counterbore to thread grooves at all points around the periphery.*



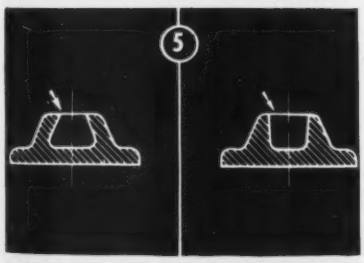
2—*Avoid diamond knurl on molded knobs. Straight knurl permits normal draw, gives neater appearance, is less expensive as it may be hobbed directly in cavity. Diamond knurl requires split molds and usually needs engraving. End knurl before it reaches flash line.*



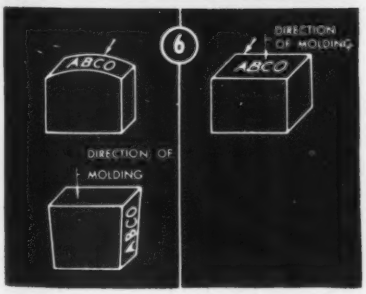
3—*Ample fillets materially improve strength of molded pieces.*



4—*Constant wall thickness promotes uniform cure and shrinkage; also, cure time depends upon the product's maximum thickness. Therefore, eliminate thick sections wherever possible to shorten time cycle.*



5—*Avoid details in design which will obstruct free ejection of parts from the mold. Wherever possible, give a liberal draft; a draft of 1° is good, of 3° is ample.*



6—*Avoid lettering on rounded surfaces. Lettering not perpendicular to the direction of molding complicates the process. It requires an extra moving piece in the mold, thus increasing time cycle and mold costs.*

7—*Sunken letters on a molded piece require cutting the mold down around them—which is expensive. Raised letters can be engraved in the mold—a cheap operation. If the product design does not permit raised letters above the surface, a sunken section as shown in CC can be utilized. Though more expensive than straight raised letters, this is less costly than sunken letters since a metal insert can contain lettering.*

8—*Webs add strength to parts with thin section and help to prevent warpage and buckling.*

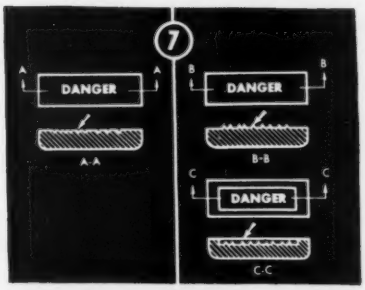
9—*Ribs help support cut-away sections of such molded parts as boxes.*

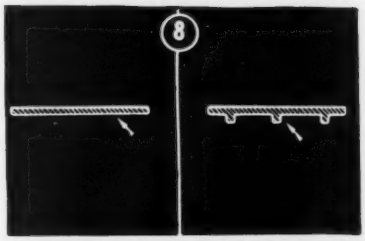
10—*Where square-cornered mating parts are required to fit the product, corner may be strengthened and corner interference avoided by use of fillet radii as shown at right.*

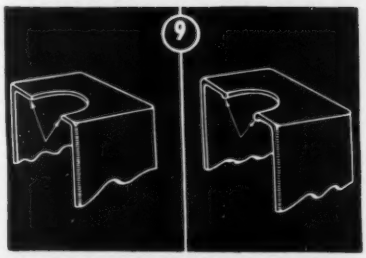
11—*Large flat surfaces show flow marks and "dog skin" clearly. Always break surface with lines or stipple.*

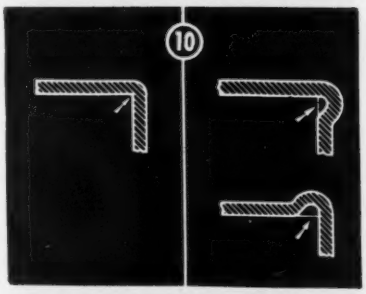
12—*Always allow ample clearance in mating such parts as top and bottom of boxes.*

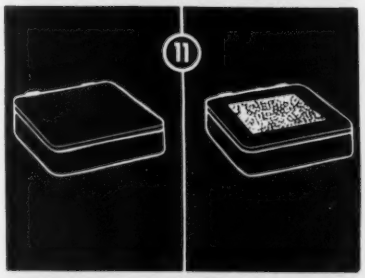
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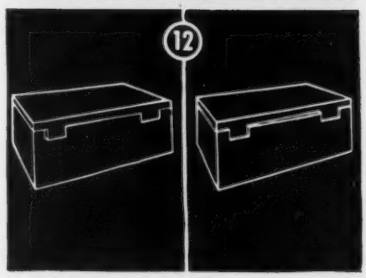












Printing on plastics

by Eugene Morley

In contemplating postwar uses of plastics, we tend to stop our thinking at a consideration of their inherent characteristics. Their resistance to solvents, to weathering, to abrasions, etc., is not surface deep—it's inherent. Color, if it is there, is inherent. These are wonderful qualities and wonderfully controllable.

The writer holds with the more progressive of our designers that it is better for color to be integral than to be skin deep. Yet we know, too, that decoration is necessary and that trade name identification is necessary. If we are going to see new containers made of plastics, we know that all of them are going to be labeled and that some are going to be decorated. The question of what should be decorated and what should not is one for the designers.

Let's not limit ourselves to a transparent world, or to one in which every colored article can have only one color. Additional colors can be molded-in with some success, but at considerable added molding expense. For years we've been molding in debossed trademarks and calibrations and wiping in color by a hand operation. For some recent war items where added color was necessary, it was found possible to insert a compression-molded shape into an injection mold with the result that the final molded article had more than one color—and required more than one molding operation.

Applied colors are something else, however. War uses of imprinting, and war restrictions on metals for civilian uses have resulted in developments in the decoration of plastics which should be noted now by our designers and our manufacturers. An interesting instance is the experience of the cosmetic trade with plastic lipstick containers. After the panic over the complete restriction of metal for this item has subsided and it had been shown that plastics were going to come to the rescue, the entire field was faced with the prospects of using scarcely more than half a dozen different molds for 300 to 500 different brands of lipstick. Decoration was a must! First, for identification, and second, to marry the new containers to already established lines.

Most of these containers were decorated by the silk-screen process. The enamels and lacquers familiar to the silk-screen trade were used confidently and seemed to be satisfactory at first. However, it had not been anticipated that the particular plastic used for these lipstick cases was one in which the plasticizer tended to respond to weather changes and to show a greater affinity for the paint or lacquer than for the plastic. The result was that the first warm, humid days saw otherwise perfect applications transformed into something resembling a good grade of chewing gum. I'm afraid that a few thousand lipsticks reached the retail market two years ago carrying decorations and trade names that were almost magically fugitive in character.

A search was immediately made for a means of solving this problem, and decorating materials and methods were evolved which seem to hint at a bright new field in coatings. The development of special materials for the coating and decorating of fabricated or molded plastic articles should become as exciting as was the development of special coatings for metal several years ago.

At first, a sealing material was tried which resisted the plasticizer exudation and which was not unfriendly to the application of the silk-screened enamel. The result was permanent enough, but it required two operations and altered the surface of the plastic in a way that was undesirable. Surface coatings of nitrocellulose lacquers were applied over printing and plastic alike, but the entire surface was then subject to deterioration from exudation. Finally, a cellulose acetate base lacquer was devised which, when sprayed over the printing, rendered it impervious to the action of the migratory plasticizer. Later, characteristics of the sprayed coat and the printing material were combined to give a printing ink which would stand up without further coating.

An unexpected feature of this printing ink was its similarity in surface to the plastic itself. It showed characteristics that were completely unfamiliar to silk-screen firms long accustomed to the use of lacquer and enamel. In the first place, no "raised" or "embossed" quality was apparent. The ink seemed to sink below the surface of the plastic as though inlaid. The solvent was quickly removed from the application substance by its affinity for the molded plastic. The application was set within 10 seconds, completely dry within 10 minutes! Upon drying, it proved completely irremovable except where such damage was inflicted that the actual surface of the plastic itself was removed.

Further experiments showed that this solvent-carried application of a plastic substance to plastic, when dry and hard, responded to finishing in precisely the same manner as the surface of the plastic itself. Light buffing or tumbling with a delicate abrasive or polishing material quickly reduces the somewhat matte surface of the application to a sheen precisely similar to that of cellulose acetate.

The same spraying and decoration substance, altered only slightly from case to case, is applicable to cellulose acetate and acetate butyrate, to acrylics and the vinyls with the same results. In its simplest form, it lends itself easily to silk-screen application. In diluted form, with slight alteration, it presents no difficulty when used as a spraying medium. However, alteration in substance must be made to achieve the proper viscosity for rubber-die and letterpress printing.

Substances are already available which have been specially designed for the coating and decoration of various plastic materials. Different coatings, of course, for different plastics. Acrylics and acetates, since they have

common solvents, can be treated as a group particularly adapted to superficial coating and decoration. The application of paint, enamel, lacquer, or any of these substances could only hope to form a superficial bond which would be inhibited by the slick surface of the plastic and would be subject to a reaction to any cold flow that might be set up. However, a prepared substance containing a solvent for the plastic, if properly balanced and adjusted for the printing or spraying process involved, can achieve much more because it can depend on the phenomenon of cohesion, rather than adhesion, for its endurance. Interesting experiments which are conclusive enough but not yet comprehensive have been made with coatings designed for polystyrene. The solubility of molded polystyrene offers at least an equal prospect for such completely successful decoration and coating as those described above for acetates and acrylics. In view of the prospective use of polystyrene in postwar products, the experiments with this type of coating promise to be more important than any yet described.

Slow-drying enamels are chosen as a rule for polystyrene. A longer drying period permits the solvents in the enamel to act upon the surface of the polystyrene in a way that ensures a permanent bond between the surface of the container and the application. In a current job involving the application of multiple colors, the uniformity of the polystyrene containers has been found of considerable help in maintaining accuracy of register. The decoration stays perfectly clean and bright in use.

The advantages of coating and decorating material of this sort are that they bond themselves permanently to the plastic and that, being similar in composition to the plastic, they do not have an "applied" appearance. In decorating metal it is often necessary to cover the entire surface, but due to the similarity in surface this is not necessary with plastics. Due to the fact that the application material invariably contains a solvent which attacks the plastic, a durable bond is formed without any baking.

Since the durability of the bond depends upon a solvent, no hope can be held for decorating or coating the phenolics in this way. However, the very stability and low water absorption of the phenolics, which prevent their accepting this type of coating, also render them less in need of special decorating materials. Baking enamels and lacquers perfected for glass and metals can be applied and baked at low temperatures to form a satisfactory bond.

Familiar brands of lipstick, face powder and rouge are now attractively packaged in surface-decorated plastic containers. The applied coloring, itself a plastic substance, has a natural affinity for the surface and won't rub off despite hard usage in handbag or purse. Color plates, Modern Plastics.



Stock molds

There are considerable numbers of stock molds available in the plastics industry which often may be used by packagers at a considerable saving of time and money. Because the mold is ready, the customer need wait only on the press capacity of the molder, the availability of labor and materials. Also, he pays little of the mold cost, since the molder usually figures on amortizing that cost over many orders.

The great majority of all plastic bottle and jar closures and many cosmetic containers come from stock molds. But the immense variety of shapes, designs and specialty items that may be obtained from existing molds is not generally realized. Specialty items include special-purpose closures such as jigger and eye-cup, applicator tips for tubes containing such products as vaginal jellies, rectal ointments, etc. Before ordering any molded plastic part, it may be well to consult the current catalog, *Plastic Stock Molds*.[1]

Use of stock molds does not preclude brand identification or individual characteristics on the finished item. If the run is long enough, the molder will be glad to adapt the stock mold with a brand name or design, and for short runs the finished molding may be branded or marked by one of several available processes. Special steel inserts, engraved with the particular wording or design desired, may be inserted in the stock mold at a slight extra cost. It is also now possible to print on plastic containers in as many colors as desired (see *Printing on Plastics* p. 594).

Some molders specialize in a particular type of stock mold. Some, for instance, have a great variety of closures. Others offer a wide range of containers.

In addition to the molds, there are extrusions and laminates, both of which offer packaging possibilities. Extruding dies are available in a number of standardized shapes and sizes. Obvious examples are tubular shapes. The packager may purchase these in continuous lengths and add bases or caps, or both, to make up a complete package. He may also utilize an extrusion with thin walls as the basis of a collapsible tube.

Laminated sheets, rods and tubes come in a great variety of standardized sizes. These have possibilities for both packages and displays. Rigid laminated tubes may be fabricated into tubular packages; sheets and rods may be used in displays.

Virtually all molders have a number of stock molds on hand from which they will sell customers any reasonable quantity of parts. Furthermore, many large custom molders will not even have to set up a mold to run off a small lot of standard item, but will have this item in stock, ready to ship, in the most wanted colors and sizes. Thus, in many cases, manufacture does not have to be considered at all.

[1] Compiled by the Stock Mold Dept. of **Modern Plastics** magazine, 122 East 42 St., N. Y. C. Price $5 in U. S. A.

1

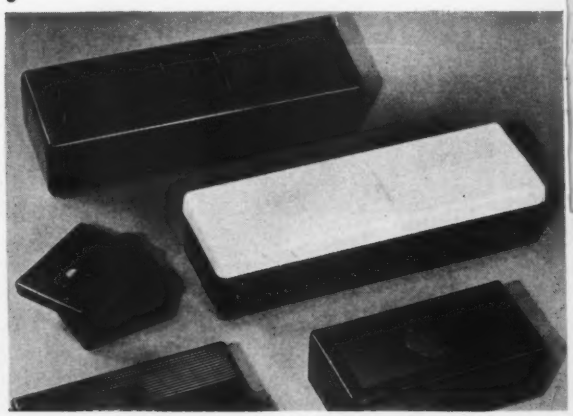


2



1—Stock mold closures are not restricted to the standard types. Hundreds of molds for fancy and specialty items such as these are in existence. 2—Cosmetic containers of many types are available from stock molds. Shown are cold cream jars, powder shakers, make-up kits. 3—These decorative boxes from stock molds have been used for such things as fruit cakes and cigarets. Re-use value is a primary consideration.

3



XUM

Valu ber men Spec

Molding
Compre
Compre lbs. p
Injectio
Injectio lbs. p
Compre
Mold S
Specific
Specific
Refract
Tensile
Elongat
Modulu lbs. p
Compre
Flexura
Impact ½ ×
Hardne (2.5 r
Hardne
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Values for properties in this chart are based on figures submitted by a number of manufacturers. Differences in test procedures and sizes of specimens may lead to erroneous conclusions if direct comparisons are attempted. Special grades of materials often excel in one particular property.

PROPERTIES OF MOLDED AN
CAST PLASTICS USED IN PACKA

PROPERTIES	PHENOL-FORMALDEHYDE COMPOUNDS			PHENOL-FURFURAL COMPOUNDS	UREA-FORMALDEHYDE COMPOUND	MELAMINE-FORMALDEHYDE COMPOUND	VINYL CHLORIDE ACETATE RESINS		VINYLIDENE CHLORIDE RESINS (Molding)	M
	Molding		Cast							
	No Filler	Woodflour Filler	No Filler	Woodflour Filler	Alpha Cellulose Filler	Alpha Cellulose Filler	Rigid	Flexible Unfilled		
Molding Qualities	Fair	Excellent	—	Excellent	Excellent	Excellent	Excellent	Good	Excellent	
Compression Molding Temp., ° F.	270–320	300–400	—	330–400	290–325	280–340	280–325	250–340	220–350	
Compression Molding Pressure, lbs. per sq. inch	2000–5000	2000–4500	—	1000–4000	1500–6000	1500–6000	1500–2000	500–1000	500–5000	
Injection Molding Temp., ° F.	—	275–375	—	250–375	—	—	280–300	250–340	300–400	
Injection Molding Pressure, lbs. per sq. inch	—	2000–20000	—	300–10000	—	—	18000–30000	18000–30000	10000–30000	
Compression Ratio	2.0–2.6	2.2–4.4	—	2.2–3.0	2.5–3.0	2.0–2.7	2	—	2	
Mold Shrinkage, inch per inch	0.009–0.011	0.006–0.010	—	0.005–0.009	0.006–0.011	0.008–0.015	0.001 Max.	0.02–0.10 (Varies with plasticizer)	0.005–0.015	
Specific Gravity	1.25–1.30	1.32–1.47	1.30–1.32	1.3–1.4	1.45–1.50	1.45–1.55	1.34–1.37	1.2–1.6	1.65–1.75	1
Specific Volume, cubic inch per lb.	22.2-21.3	20.0–18.9	21.3–20.0	21.3–19.8	19.1–18.5	19.1–17.8	20.7–20.2	23.0–17.3	16.8–15.8	2
Refractive Index, nD	1.5–1.7	—	1.59–1.61	—	1.54–1.56	—	1.53	—	1.60–1.63	1
Tensile Strength, lbs. per sq. inch	7000–8000	6500–9500	8500–10000	5000–8500	8000–13000	8000–13000	8000–10000	1000–9000	4000–7000	60
Elongation, percent	—	0.4–0.8	—	—	—	—	—	Up to 500	10–40	
Modulus of Elasticity in Tension, lbs. per sq. inch × 10^5	7–10	10–15	4	10–25	12–15	—	3.5–4.1	—	0.7–2.0	
Compressive Strength, lbs. per sq. inch	10000–30000	25000–36000	20000–25000	28000–36000	25000–30000	27000–37000	—	—	7500–8500	11
Flexural Strength, lbs. per sq. inch	12000–17000	9000–12000	10000–12000	8000–15000	10000–16000	10000–16000	12000–14000		15000–17000	10
Impact Strength, ft. lbs. per in. of notch ½ × ½ in. notched bar, Izod test	0.36–0.50	0.20–0.40	0.5–0.6	0.26–0.40	0.28–0.32	0.24–0.35	0.4–1.2	(Varies with plasticizer)	0.3–1.0	
Hardness, Brinell No. (2.5 mm. ball, 25 kg. load)	—	30–45	—	35–40 (50 kg.)	48–54 (500 kg., 10 mm.)	—	12–15	—	—	
Hardness, Rockwell	M120–M130	M110–M120	M65–M80	B65–B75	M110–M130	—	—	—	M50–M65	
Thermal Conductivity, 10^{-4} cal. per sec. per sq. cm./1° C. per cm.	3–6	4–7	3–5	3.5–5	7.1		4.0	3.9–4.0	2.2	
Specific Heat, cal. per ° C. per gram	0.3–0.4	0.35–0.40	0.3–0.4	0.3–0.4	0.4	—	0.24	0.30–0.50	0.32	
Thermal Expansion, 10^{-5} per ° C.	2.5–6.0	3.0–4.0	8–11	3	2.5–3.0	—	6.9	7–25	19	
Resistance to Heat, ° F. (continuous)	250	300	160	250	170	210	130	150	160–200	1
Distortion under Heat, ° F.	240–260	260–300	113–176	270–290	260–280	385	140–150	—	150–180	1
Water Absorption, 24 hrs., %	0.1–0.2	0.4–1.0	0.4–0.6	0.2–0.6	0.5–0.7	0.3–0.6	0.05–0.15	—	<0.1	
Burning Rate	Very low	Very low	Very low	Very low	Very low	Nil	Nil	(Varies with plasticizer)	None	
Effect of Sunlight	Surface darkens slightly	Light shades discolor	Colors may fade	Light shades discolor	None	Slight color change	Darkens on prolonged intense exposure	Slight fading	Slight	Ver
Effect of Weak Acids	None to slight depending on acid			None to slight depending on acid	←	None	None	None	None	Pra
Effect of Strong Acids	Decomposed by oxidizing acids; reducing and organic acids none to slight effect			Decomposed by oxidizing acids; reducing and organic acids no effect	Decomposed or surface attacked	Decomposes	None	None to slight	Highly resistant	Affec
Effect of Weak Alkalies	Slight	Slight to marked depending on alkalinity		Slight to marked depending on alkalinity	←	None	None	None	Resistant	Prac
Effect of Strong Alkalies	Decomposes	Decomposes	Decomposes	Decomposes	Decomposes	Attacked	None	None to slight	Resistant	Prac
Effect of Organic Solvents	None	None on bleed-proof materials	Attacked by some	None on bleed-proof materials	←	None	Resists alcohols, aliphatic hydrocarbons, and oils. Soluble in ketones and esters; swells in aromatic hydrocarbons		Resistant	Sol and
Effect on Metal Inserts	Inert	Inert	Inert	Inert	Inert	Inert	Inert	Inert	Inert	In
Machining Qualities	Fair	Fair to good	Excellent	Fair to good	Fair	Fair	Good	—	Good	Fa exc
Clarity	Transparent translucent	Opaque	Transparent translucent opaque	Opaque	Translucent opaque	Translucent	Transparent to opaque	Transparent to opaque	Translucent to opaque	
Color Possibilities	Dark colors	Limited	Unlimited	Limited	Unlimited; pastel shades	Unlimited	Unlimited	Unlimited	Extensive	Unli

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PERTIES OF MOLDED AND ASTICS USED IN PACKAGING

The manufacturer material. In orde these materials, th chemical types of p

A-LDE-E UND	MELAMINE-FORMALDE-HYDE COMPOUND	VINYL CHLORIDE ACETATE RESINS		VINYLIDENE CHLORIDE RESINS (Molding)	METHYL METHACRY-LATE RESIN		POLY-STYRENE	Et cell
ellu-ller	Alpha Cellu-lose Filler	Rigid	Flexible Unfilled		Cast	Molding		
ent	Excellent	Excellent	Good	Excellent	Good	Excellent	Excellent	Exc
25	280–340	280–325	250–340	220–350	—	280–370	275–350	25
000	1500–6000	1500–2000	500–1000	500–5000	—	1000–3000	1000–5000	50
	—	280–300	250–340	300–400	—	325–500	375–500	35
	—	18000–30000	18000–30000	10000–30000	—	10000–30000	10000–30000	300
.0	2.0–2.7	2	—	2	—	1.6–2.2	2.0–2.3	2.0
.011	0.008–0.015	0.001 Max.	0.02–0.10 (Varies with plasticizer)	0.005–0.015	—	Compression 0.001–0.005 Injection 0.003–0.006	Compression 0.002–0.005 Injection 0.002–0.008	0.00
.50	1.45–1.55	1.34–1.37	1.2–1.6	1.65–1.75	1.18–1.20	1.16–1.20	1.054–1.070	1.0
8.5	19.1–17.8	20.7–20.2	23.0–17.3	16.8–15.8	23.4–23.0	23.8–23.0	26.3–25.9	25.
.56	—	1.53	—	1.60–1.63	1.49–1.50	1.49–1.51	1.59	1
3000	8000–13000	8000–10000	1000–9000	4000–7000	6000–10000	4000–10000	5000–9000	200
	—	—	Up to 500	10–40	1–15	1–15	2–5	5
5	—	3.5–4.1	—	0.7–2.0	3–5	3–5	1.7–4.7	1
0000	27000–37000	—	—	7500–8500	11000–13000	10000–15000	11500–15000	800
6000	10000–16000	12000–14000	(Varies with plasticizer)	15000–17000	10000–15000	10000–19000	8000–19000	300
.32	0.24–0.35	0.4–1.2		0.3–1.0	0.2–0.6	0.2–0.4	0.3–0.5	0.6
4 0 mm.)	—	12–15	—	—	18–20	18–20	20–30	4.0 (10
M130	—	—	—	M50–M65	M100	M60–M112	M75–M90	R20
		4.0	3.9–4.0	2.2	4–6	4–6	1.9	3.
	—	0.24	0.30–0.50	0.32	0.35	0.35	0.32	0.3
.0	—	6.9	7–25	19	8	8–9	6–8	1
	210	130	150	160–200	140–160	120–160	150–190	14
80	385	140–150	—	150–180	155–175	145–190	170–175	12
.7	0.3–0.6	0.05–0.15	—	<0.1	0.4	0.3–0.5	0.00–0.05	1.
ow	Nil	Nil	(Varies with plasticizer)	None	Slow	Slow	Slow	S
e	Slight color change	Darkens on prolonged intense exposure	Slight fading	Slight	Very slight	Very slight	Yellows slightly	S
-	None	None	None	None	Practically nil	Practically nil	None	S
osed face ed	Decomposes	None	None to slight	Highly resistant	Affected only by oxidizing acids		Attacked by oxidizing acids	Dec
-	None	None	None	Resistant	Practically nil	Practically nil	None	N
oses	Attacked	None	None to slight	Resistant	Practically nil	Practically nil	None	S
-	None	Resists alcohols, aliphatic hydrocarbons, and oils. Soluble in ketones and esters; swells in aromatic hydrocarbons		Resistant	Soluble in ketones, esters and aromatic hydrocarbons		Soluble in aromatic and chlorinated hydrocarbons	W so
t	Inert	Inert	Inert	Inert	Inert	Inert	Inert	I
r	Fair	Good	—	Good	Fair to excellent	Excellent	Fair to good	G
cent ue	Translucent	Transparent to opaque	Transparent to opaque	Translucent to opaque	Transparent (90–92% light transmission)		Transparent (88–92% light transmission)	Tra tra o
ted; hades	Unlimited	Unlimited	Unlimited	Extensive	Unlimited	Unlimited	Unlimited	Un

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nufacturers should always be consulted before making a choice of l. In order to facilitate communications with the producers of aterials, the names and addresses of manufacturers of each of these al types of plastics are listed in the Directory Section.

	CELLULOSE COMPOUNDS				
	Ethyl-cellulose	Cellulose Acetate	Cellulose Acetate, High Acetyl	Cellulose Acetate Butyrate	Cellulose Nitrate (Pyroxylin)
nt	Excellent	Excellent	Excellent	Excellent	Good
50	250–360	260–390	260–390	260–370	185–250
000	500–5000	500–5000	500–5000	2000–5000	2000–5000
00	350–460	340–500	340–500	340–420	—
0000	3000–30000	3000–30000	3000–30000	3000–30000	—
.3	2.0–2.5	2–2.8	2.0–2.8	2.0–2.8	—
sion 005 on 006	0.001–0.011	Positive and injection 0.002–0.003; Semi-positive 0.005–0.007; Flash 0.008–0.009			—
.070	1.07–1.18	1.27–1.37	1.27	1.10–1.24	1.35–1.40
5.9	25.7–23.4	21.8–20.2	21.8	25.2–22.4	20.5–19.8
	1.470	1.46–1.50	1.47	1.47–1.49	1.50
000	2000–9000	1500–8200	3000–8000	1400–6700	3000–10000
	5–100	7–80	4–45	35–95	25–50
.7	1–5.0	0.6–3.5	1.0–3.5	0.5–2.0	2–4
5000	8000–20000	5000–30000	5000–30000	7500–22000	20000–30000
000	3000–12000	2000–12000	2000–12000	1600–12000	6000–15000
.5	0.6–11.5	0.4–6.2	0.7–6.0	0.6–9	2.0–8.0
0	4.0–11 (10 kg.)	4.5–12 (10 kg.)	6–12 (10 kg.)	6–12	8–11 (10 kg.)
190	R20–R110	R40–R120	R80–R120	R40–R120	R90–R120
	3.8–6.3	4–8	5	4–8	3.1–5.1
2	0.32–0.46	0.3–0.45	0.37–0.42	0.3–0.4	0.34–0.38
	10–14	8–16	10–15	11–17	6–16
90	140–220	140–220	150–220	140–220	ca. 140
75	120–200	100–215	120–215	100–180	120–165
0.05	1.0–2.0	2.0–6.0	1.5–2.9	1.0–2.4	0.7–4.0
w	Slow	Slow	Slow	Slow	Very high
ws tly	Slight	Slight	Slight	Slight	Discolors and becomes brittle
e	Slight	Slight	Slight	Slight	Slight
ed by g acids	Decomposes	Decomposes	Decomposes	Decomposes	Decomposes
e	None	Slight	Slight	Slight	Slight
e	Slight	Decomposes	Decomposes	Decomposes	Decomposes
e in c and ated rbons	Widely soluble	Soluble in ketones and esters; softened or slightly soluble in alcohol; little affected by hydrocarbons			
rt	Inert	Inert	Inert	Inert	—
good	Good	Good	Good	Good	Good
arent % light ssion)	Transparent translucent opaque	Transparent translucent opaque	Transparent translucent opaque	Transparent translucent opaque	Transparent translucent opaque
nited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited



Plastic strip coating

During the last year plastic strip-coat packaging has become a full-fledged military method, and its use has grown by leaps and bounds. There are now estimated to be several hundred military contractors using the method, and a score of companies produce the ethyl-cellulose coating material.

With proper equipment, the method is simplicity itself. Any simple metal part, without openings too large to be bridged by the plastic coating, may be dipped after being properly cleaned. In a single or double dip it acquires a tough plastic skin approximately $\frac{1}{10}$-in. thick which cools and hardens in a few seconds. This coating not only provides protection during shipment, but tests indicate that it is probably the most efficient of all packages in preventing corrosion under the most extreme conditions.

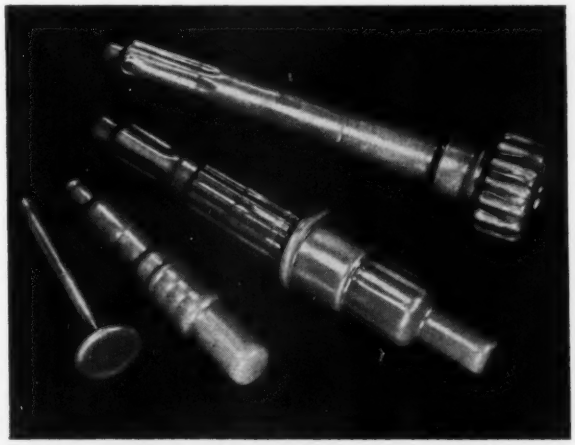
Usually the cord which is used to suspend the part in dipping is left protruding from the coating, and this serves as a tear-tape for opening. Otherwise the coating may be slit with a knife. It peels off like a banana skin, leaving the part perfectly clean and ready for use.

One caution involves the use of a cord which will not wick moisture into and under the skin. With the use of heavily waxed string, Fiberglas or twisted cellophane cord, now on the market, this problem may be overcome.

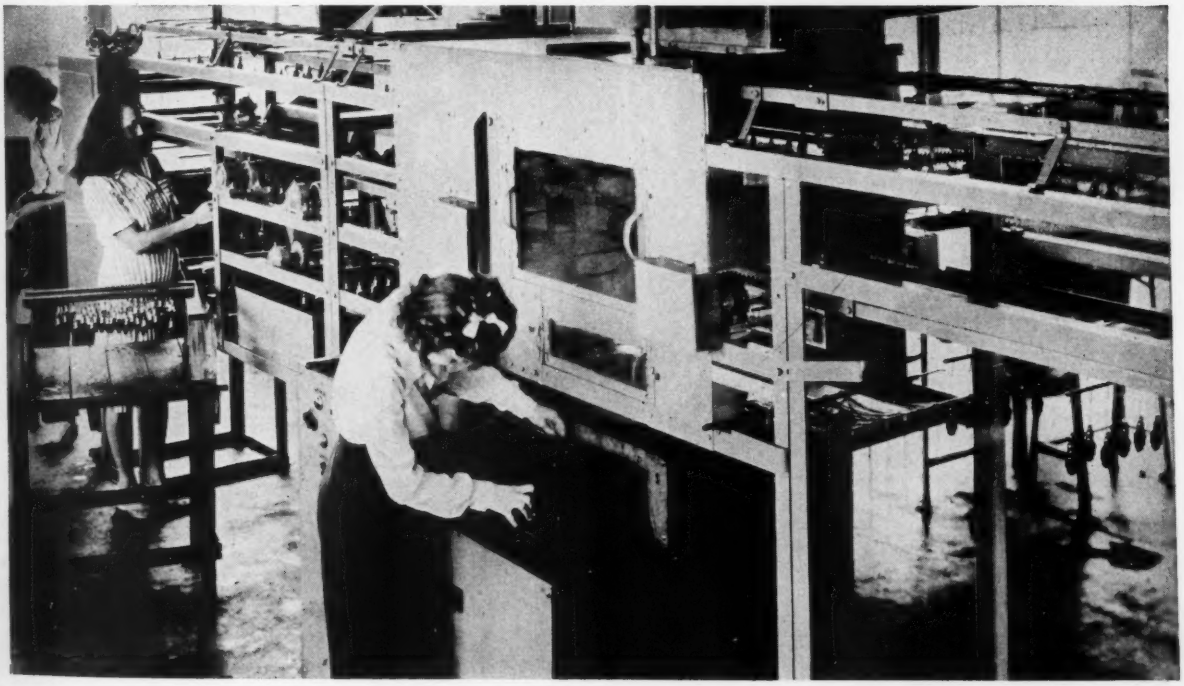
The most important precaution is to use a heating and dipping tank which will maintain the plastic melt at the precise temperature specified for it (usually 350°—375° F.). Several highly efficient tanks, involving the use of thermostatically controlled heating elements, circulating hot oil and circulation of the plastic, are now on the market and widely used.

Peacetime use of this type of package for such items as automotive replacement parts is obvious. Already one of the first fully automatic setups is dipping spark plugs at the rate of 4500 an hour. The coating can be made transparent or given any color desired. (See also *Packaging for Government Orders*, p. 96, and *Packaging of Metal Parts*, p. 791.)

1



2



1—Plastic coating effectively protects metal parts, is readily stripped. Photo, Dow Chemical Co. 2—Conveyor-line dipper in use on spark plugs at Corcoran Brown Lamp Works. Photo, Youngstown Miller Co.

Trends to watch

Normally, new plastic materials and methods are applied to packaging almost immediately on development. Although plastics have been used in attacking war-born packaging problems, this close relationship has been interrupted during the war, and the full import of recent plastic developments awaits V-Day.

A development which may have direct effect on injection molding materials is blowing of thermoplastics. This process, a development from glass-blowing methods, makes available thin-walled bottles and other necked vessels on a mass-production basis. Advantages are light weight and less fragility than glass plus potentially low-cost fabrication. Virtually all injection molding materials have been successfully blown, but polystyrene appears to be particularly well suited for this process. The bottles have been proved in Medical Corps use.

It is likely that rigid transparent sheets with markedly high moisture- or liquid-proofness will be evolved, either by coatings or by changes in basic materials. Their use will expand when they can be used as primary containers for moist foods, liquid food products, paste or liquid cosmetic preparations and the many other products where retention of moisture or liquid is of vital importance.

Among the important new developments are those which overcome the size limitations of standard parts. They provide great economy in manufacture. It is possible that they forecast penetration of plastics into use as crates, large boxes and other shipping containers, where their light weight and high strength would be valuable.

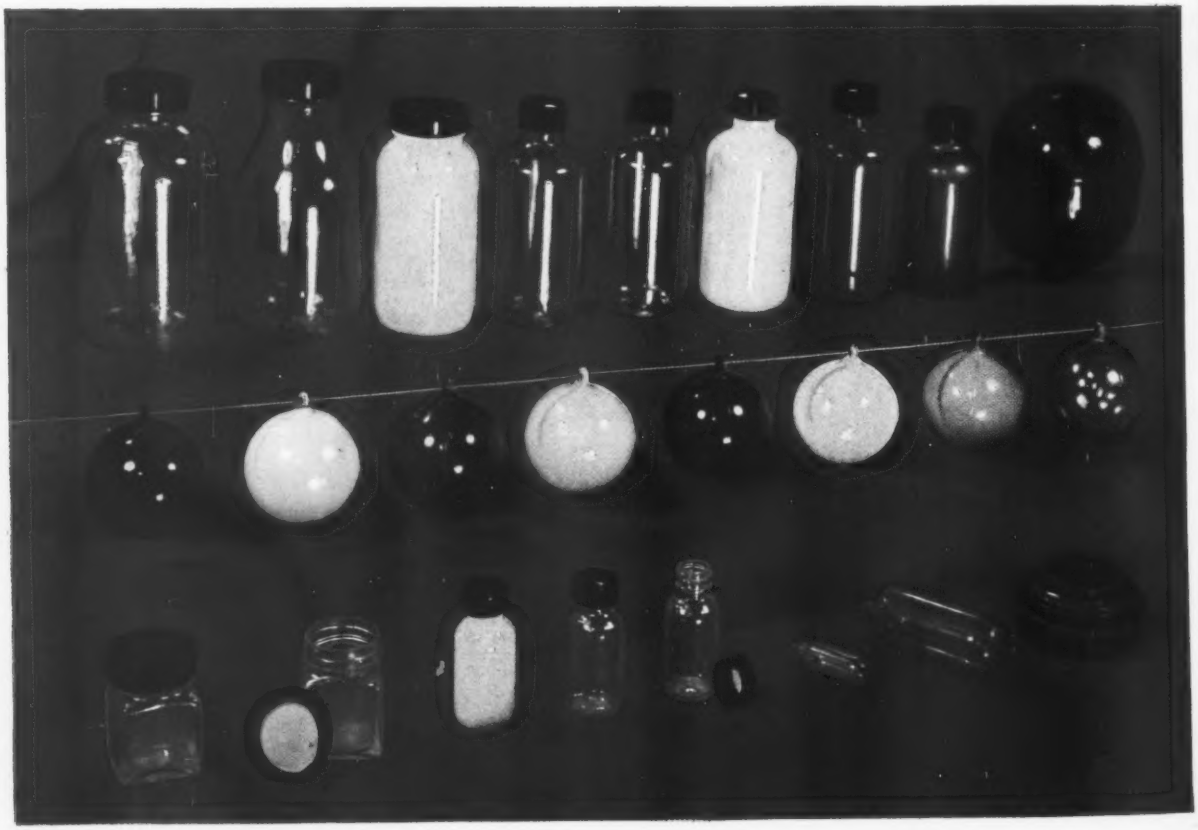
Resin-fibre molding batts comprise a blanket of loose sisal fibres, impregnated with a phenolic resin and molded into shape by rubber-bag molding. Large, light parts are thus produced at relatively low cost.

Pulp preform moldings are based on matted paper pulp dispersed with phenolic resin. This material should be applicable to making box-like shapes.

Low-pressure laminates use combinations of new resins and cloth fillers of glass fibre or resin.

New plastics announced during the war years include nylon, polyethylene, heat-resistant polystyrene derivatives, new vinyl compounds and silicones. It is not to be expected that these will find immediate wide use in packaging. These new materials are relatively high priced and are available at first in limited quantities.

Showing representative sizes and shapes of thermoplastic bottles formed by blow molding. Large numbers of such bottles are used by the armed forces.



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PLASTICS



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These wartime developments reflect tomorrow's packaging trends

TAKE a good look at these Durez phenolic plastic containers. Notice the intricate makeup of each . . . the molded-in inserts . . . the durable construction. They are but two of many amazing wartime packaging developments that reflect tomorrow's trends. Illustrated at right is an aircraft sextant case molded from a Durez phenolic compound. Not only does this remarkable container possess high impact strength but also it is extremely lightweight, and resistant to moisture and temperature extremes.

The box at left is a wartime developed container for a radio battery. It is extremely rugged, water resistant — and possesses high dielectric strength.

The versatility of the more than 300 Durez phenolic molding compounds combined with the many new molding methods and processes developed by America's custom molders, has resulted in many unusual developments in the container field—and offers an almost unlimited source of possibilities for the postwar container manufacturer.

Any assistance which Durez technicians can offer to you or your custom molder towards the successful development of your postwar packages will be given wholeheartedly. Durez Plastics & Chemicals, Inc., 551 Walck Road, North Tonawanda, N. Y.

A TIP ON CAPS

Because of non-bleeding, good moldability, excellent appearance, and durability—all properties of Durez phenolics, they are used extensively throughout the closure field. Bottle and tube caps in all sizes and shapes are daily proving their value in helping to move merchandise faster.

DUREZ PHENOLIC RESINS

PLASTICS THAT FIT THE JOB

LUMARITH* SHEETS AND

A Celanese Plastic*

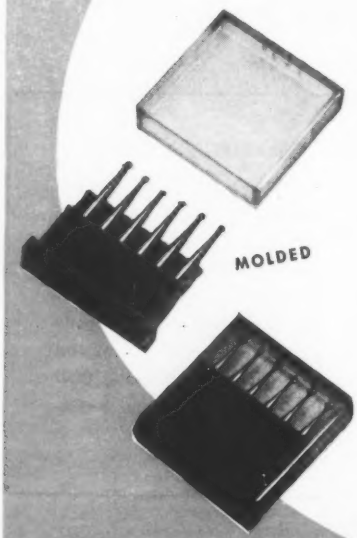
For Plastic



MOLDED AND FABRICATED

Consumer appeal is only one of the many advantages of the Lumarith plastic package. Lumarith provides the ultimate in product protection—against breakage, contamination and soiling. Contents of the Lumarith transparent container are visible without unpacking—important in the elimination of shopworn merchandise.

In many cases, the Lumarith container can be designed to give a product additional usefulness, provide a re-use feature, serve as a case for counter display.



MOLDED

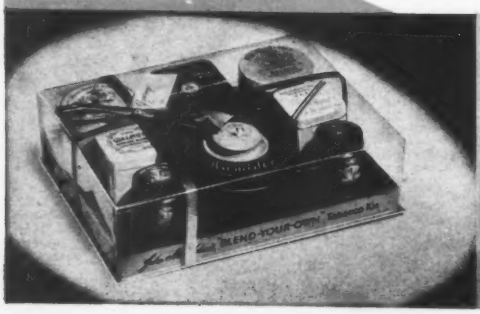
SHEETS—Packages for food, cosmetics, drugs, closet accessories, displays . . . the list of Lumarith sheet packaging applications is ever lengthening. Retailers know the sales-appeal that goes with the Lumarith package. Converters find Lumarith ideal for fabricating. It is tough, flexible and easily worked. Lumarith can be cut, sawed, stamped, drawn, heat-formed, sewed, stitched, drilled, punched, cemented and otherwise fabricated. Lumarith sheets are available in thicknesses from .005" to .250" inclusive—in crystal clear, translucent and opaque forms—in tints, solid colors and various mottles and configurations.

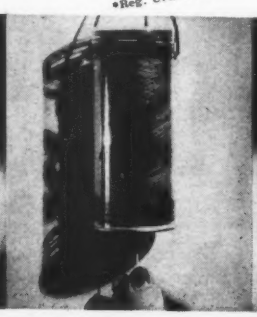
SPIRALS—Lumarith spirals—round or rectangular—provide the manufacturer with a tough utility container for articles such as: toothbrushes, thermometers, pencils, cutlery, artist's supplies, mechanical replacement parts, instruments . . . Lumarith spirals, while not crystal clear, allow for complete visibility. Spiral containers can be fabricated with metal bottoms.

MACHINERY—The Celanese Plastics Corporation is at present working closely with manufacturers of packaging equipment. Automatic machines that will speed and improve drawing and forming operations

LUMARITH* C.A.
Cellulose Acetate

*Reg. U. S. Pat. Off.







MOLDING MATERIALS

Packaging

have been developed. If you are interested in this type of equipment, you are invited to consult us.

MOLDING MATERIALS—Lumarith C.A., Lumarith X and Lumarith E.C. molding materials have also been outstanding wartime packaging materials. Protection of war supplies doesn't demand glamour, yet these plastics, noted for the packaging artistry they inspire, were selected by military authorities for critical packaging assignments. The reason is plain. Lumarith plastics are tough—certain formulations exhibit toughness right down to 40 degrees below zero. All formulations are water, oil, grease and contamination proof. Lumarith can be molded quickly and economically into complicated shapes—instructions and product identification can be molded in. Lumarith plastics can be molded with metal inserts.

Lumarith, too, can give re-use features to packages; can contribute to the function of the contents; can be molded in colors. Postwar, the usefulness and beauty of Lumarith molded packages will be limited only by the skill and genius of the package designer.

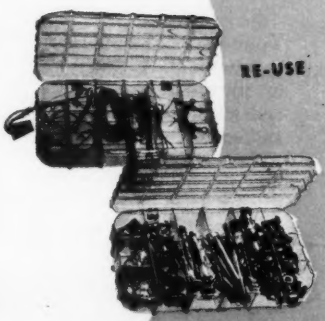
AVAILABLE—Lumarith molding materials are available in unlimited color range, transparent, transparent and translucent tints, opaque . . . in a series of formulations which accent various physical and chemical properties. Celanese Plastics Corporation, 180 Madison Avenue, New York 16, N.Y. A Division of Celanese Corporation of America.

LUMARITH® X	LUMARITH® E.C.	CELLULOID®
High Acetyl Cellulose Acetate	Ethyl Cellulose	Cellulose Nitrate

See Other Lumarith Advertisements, pages 286-287, 468-469



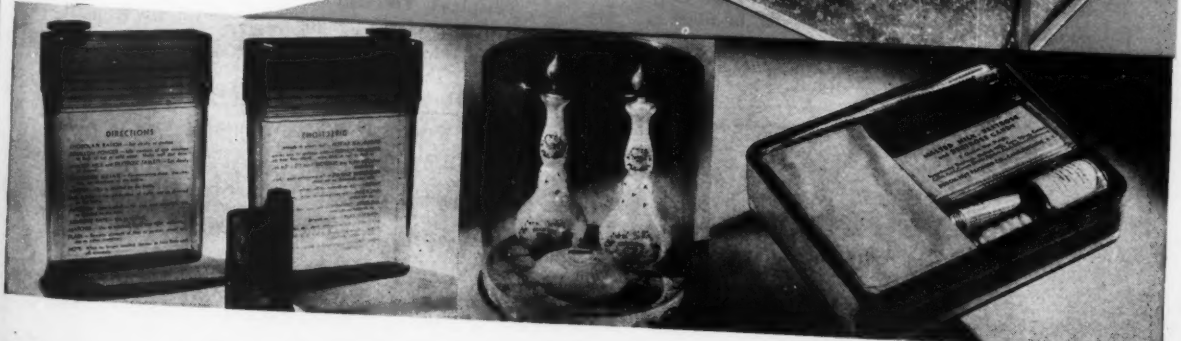
SPIRALS



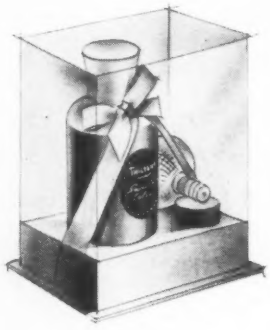
RE-USE



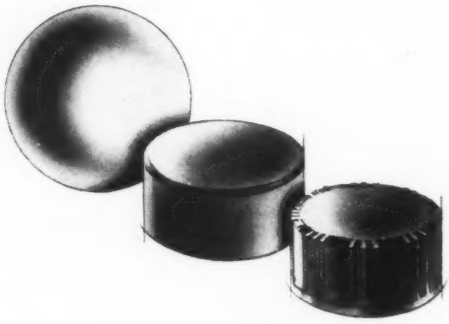
FABRICATED



WHAT TO LOOK FOR IN



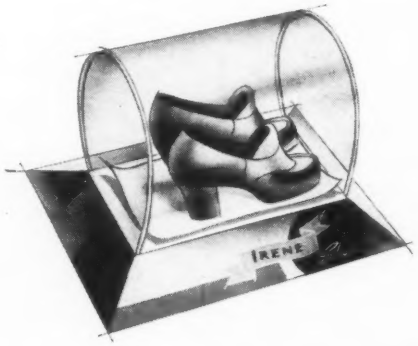
Your old favorite, rigid, transparent Vuepak, is tougher and better than ever, thanks to its wartime service. You can look for more and more packages using Vuepak, to *show* and *sell* as well as *protect* their contents. You will see it used alone and also in combination with many other materials.



For closures, you will have a wider range of familiar Resinox phenolics with the new Resimene melamines for special jobs calling for a wider color range. You can also count on wider use of thermoplastics, thanks to improved Lustron polystyrenes and the new Cerex heat-resistant thermoplastics.



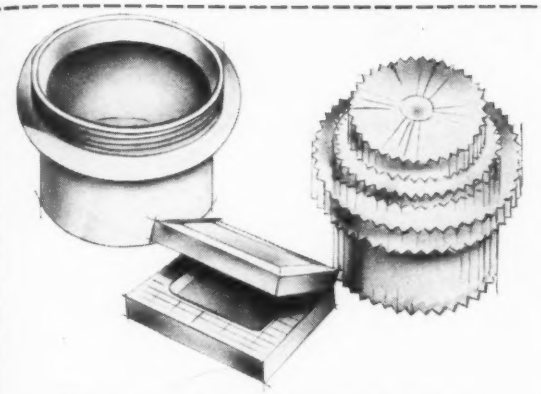
With the growth of air freight, the need for strong, lightweight, reusable shipping containers is sure to grow. With development of the new Resinox and X-500 low-pressure or contact resins, this need promises to be filled . . . effectively . . . economically . . . with laminated paper, cloth, wood veneers.



The prewar trend toward counter displays of rigid, transparent Vuepak is sure to grow and you will see even wider, more effective use of Vuepak and thicker Fibestos sheets in window displays. You will also see more counter and window pieces molded in large volume from colorful Lustron, Fibestos, Cerex, Resimene.

For the help of an experienced Monsanto consultant on *your* packaging problems, write:
MONSANTO CHEMICAL COMPANY, Plastics Division, Springfield 2, Massachusetts.

PACKAGING PLASTICS



With improved molding compounds of both thermosetting Resinox and Resimene plus thermoplastic Lustron, Fibestos and Cerex, you can plan on more molded plastics containers . . . at lower finished costs . . . with wider utility . . . and greater sales appeal . . . than ever before.



One of the great packaging achievements of the war has been the development of moisture-vapor-proof packages of laminated metal foils incorporating Monsanto vinyl acetal films. Undoubtedly you can look for wide use of such materials wherever moisture-tight packages are essential.

The Broad and Versatile Family of Monsanto Plastics

CEREX — new heat-resistant thermoplastic molding compounds . . . the first rigid thermoplastics ever developed that can stand service at boiling water temperatures and above.

FIBESTOS — cellulose acetate . . . supplied both as tough, colorful sheets, rods, tubes and special shapes . . . and as molding compounds.

LUSTRON — polystyrene molding compounds . . . potentially one of the most plentiful, economical postwar plastics . . . noted for lustrous finish, limitless color range, dimensional stability, lightweight, wide chemical resistance.

NITRON — cellulose nitrate . . . tough, dimensionally stable sheets, rods, tubes and special shapes with limitless color possibilities.

RESIMENE — newly developed, thermosetting melamine compounds with wide color possibilities and excellent wear and weather resistance . . . supplied as molding compounds . . . and as laminating or impregnating resins for use with other materials.

RESINOX — thermosetting phenolic resins . . . supplied in a wide range of molding compounds, many especially developed for packaging uses . . . and as laminating or impregnating resins for use with other materials.

VINYLS — rubber-like, vinyl acetal resins which can be supplied in either thermoplastic or thermosetting (vulcanizable) forms . . . for use with metal foils in moisture-proof packages . . . as heat-sealing, free films . . . and for many other special uses in combination with other materials.

VUEPAK — the famous, rigid, transparent cellulose acetate sheets developed especially for packaging . . . available in sheets or continuous rolls . . . in thicknesses for .005 to .020 . . . and widths up to thirty inches.

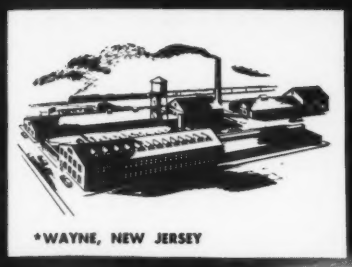
VUE-PAK
TRANSPARENT PACKAGING MATERIAL

MONSANTO
PLASTICS
SERVING INDUSTRY...WHICH SERVES MANKIND

Fabricators of
Rigid Transparent and Colorful Packages

NATIONAL TRANSPARENT PLASTICS CO.

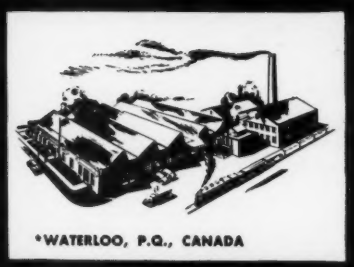
1897 COLUMBUS AVENUE • SPRINGFIELD 3, MASS.
507 FIFTH AVENUE, NEW YORK, N. Y.



*WAYNE, NEW JERSEY



*ARLINGTON, VERMONT



*WATERLOO, P.Q., CANADA

FACILITIES* COMPLETE AND AMPLE

..to fulfill TODAY'S big tasks!

Peacetime production of the world's myriad of commodities, necessities and luxuries in its entirety is far greater in scope than is generally realized. Supplying the needs of a nation is a major undertaking; when the potentials are a host of nations, the task stuns the imagination.

As with industry in general, the experience and craftsmanship of MACK MOLDING has advanced to a position comparable with other allied fields of endeavor. This fact, plus the adequate facilities of three modernly equipped and completely staffed plants, give credence to our offer of customer collaboration.

Inquiries should be addressed to MACK MOLDING COMPANY, 100 Main Street, Wayne, New Jersey.



...One in a Million

Molded by

Creators of screw and snap plastic closures and molders of custom made packages by the millions for the pharmaceutical, cosmetic and allied trades.

TECH-ART
PLASTICS COMPANY
36th Ave. and 41st St. • Long Island City, N. Y.
Tel. AStoria 8-6050-1
SUCCESSORS TO BOONTON RUBBER MANUFACTURING CO.
PIONEER PLASTIC MOLDERS . . . Established 1891

XUM

GLOSS AND SPARKLE



YOUR PACKAGE

FOR YOUR PACKAGING!

Well-proven as a high-powered sales builder is the sparkling color or crystal-clear transparency of cellulose acetate sheeting.



The gleam and sparkling color of nitrocellulose lacquer coatings on labels and boxes provide high sales appeal at low cost. Famous for toughness—resistant to liquids, perspiration, dust, handling. For helpful information on packaging, write to Cellulose Products Dept., Hercules Powder Company, 931 Market Street, Wilmington 99, Del.



WAR USES POINT TO PEACE

Outstanding among the many important wartime achievements of packaging experts is the application of ethyl cellulose coating to seal first-aid dressings (and other vital supplies) against any and every battle condition. Packaging men chose ethyl cellulose compositions as the heat-sealing bond for a paper foil-cellophane laminate material. Air-tight, water-tight, stable to all extremes of climate. These hardy properties of ethyl cellulose suggest many useful applications for peacetime packaging. Send for further details to Cellulose Products Dept., Hercules Powder Company, 931 Market Street, Wilmington 99, Delaware.

STRONGER HEAT-SEALING WITH CELLULOSICS!

Tremendous strides have recently been made in the technique of heat-sealing packages with various cellulosics and resin derivatives. Investigate this promising development!

HERCULES

XUM



ACE

artime
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PLASTICS AND PACKAGING

There are a great many places where plastics can be used as a packaging material for war products. The General Electric Company would like you to consider their broad experience in this field gained from the many plastic packages they have produced from a wide variety of materials.

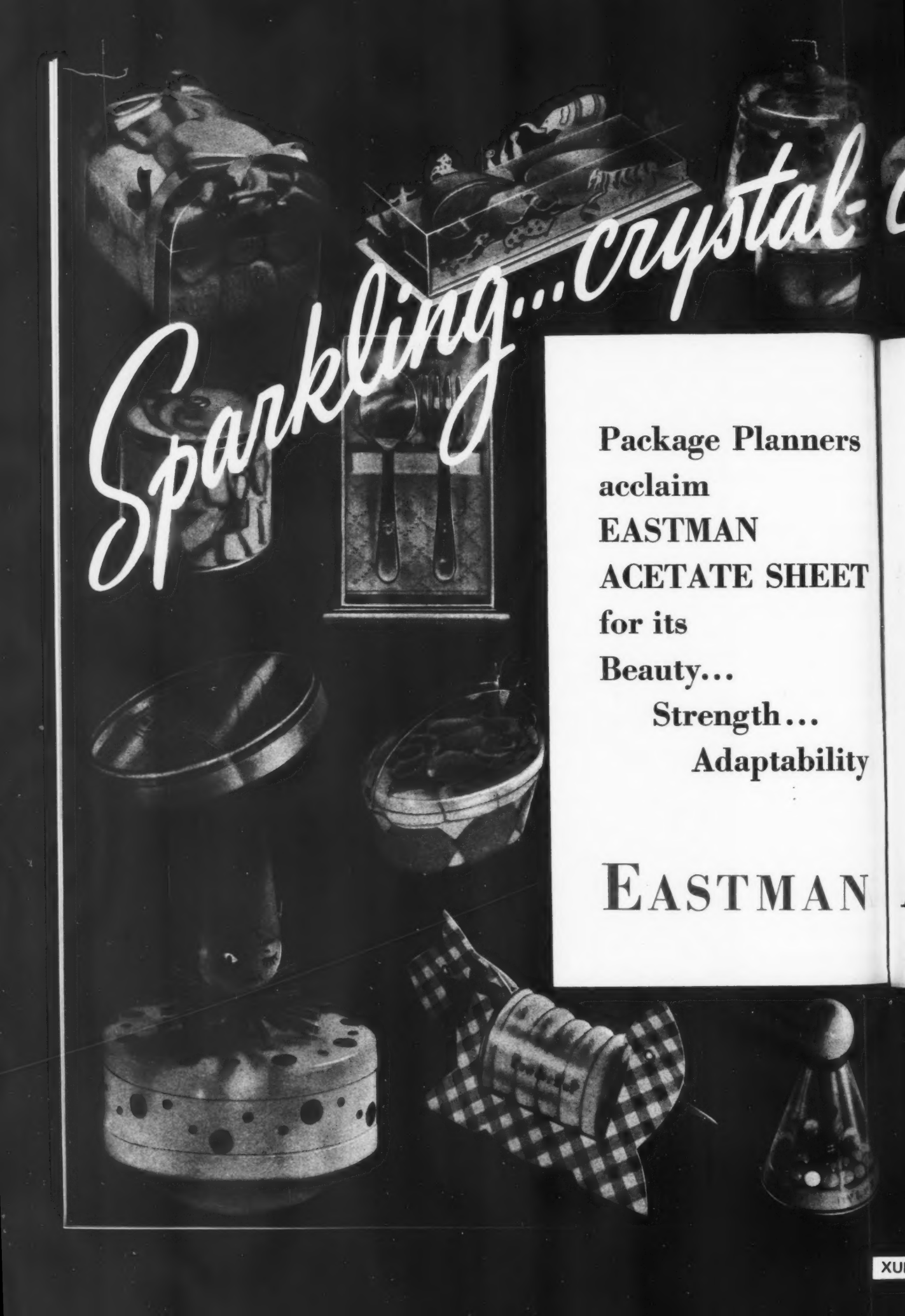
With innumerable methods of assembly combined with versatile materials, General Electric is able to design and engineer a custom package to suit your needs—to give you not only economy of manufacture but high quality products.

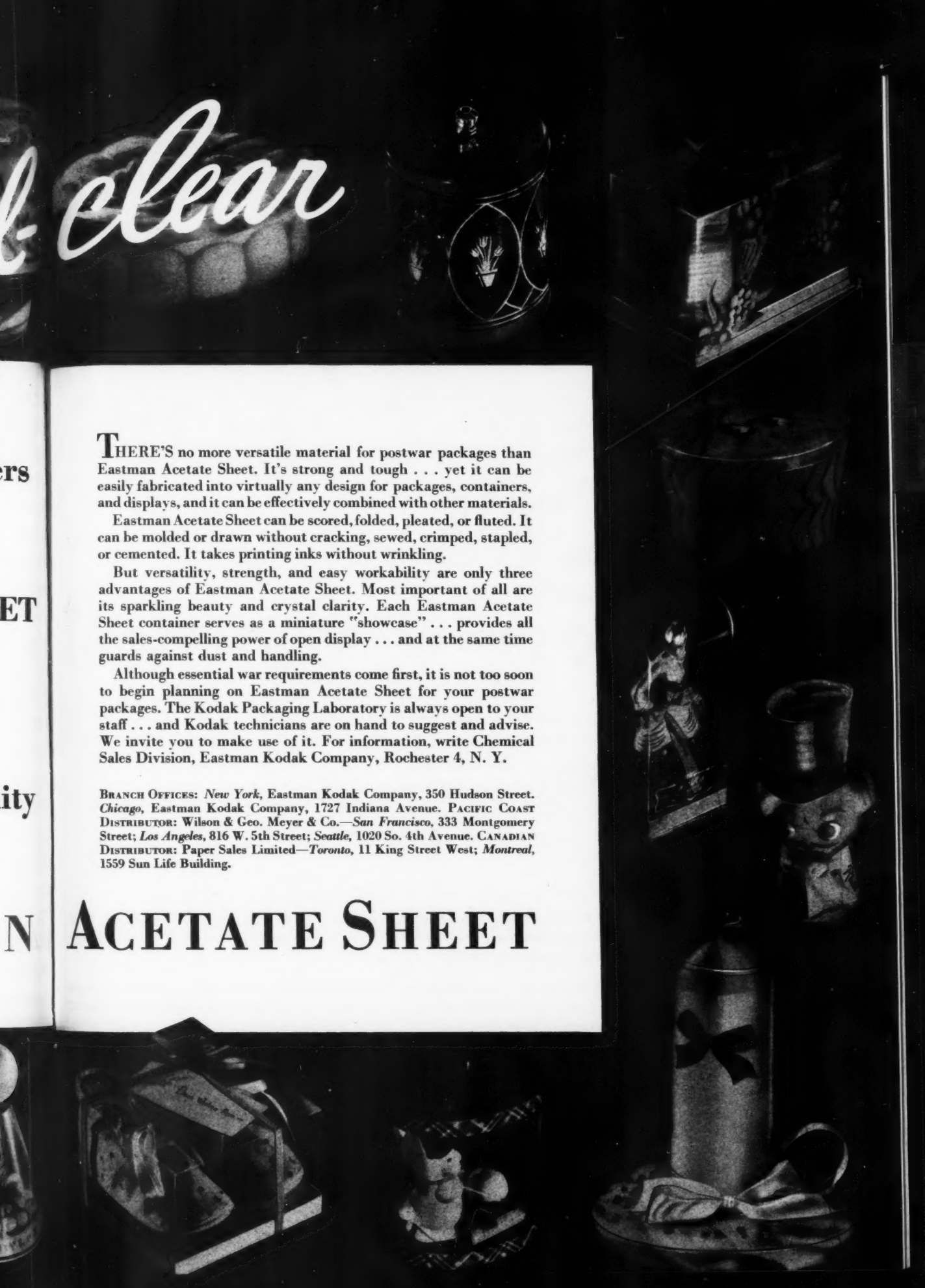
G-E designers, backed by knowledge of plastics and packaging, are ready to assist you. Plastics should be a consideration to help solve your problems of the present. G-E plasticians are also ready to apply these colorful materials to your packaging plans for the future. For further information write Section Q-283, One Plastics Avenue, Pittsfield, Mass.

FIFTY YEARS IN THE PLASTICS INDUSTRY

GENERAL ELECTRIC

PD-283


Sparkling...crystal-
Package Planners
acclaim
EASTMAN
ACETATE SHEET
for its
Beauty...
Strength...
Adaptability
EASTMAN



THERE'S no more versatile material for postwar packages than Eastman Acetate Sheet. It's strong and tough . . . yet it can be easily fabricated into virtually any design for packages, containers, and displays, and it can be effectively combined with other materials.

Eastman Acetate Sheet can be scored, folded, pleated, or fluted. It can be molded or drawn without cracking, sewed, crimped, stapled, or cemented. It takes printing inks without wrinkling.

But versatility, strength, and easy workability are only three advantages of Eastman Acetate Sheet. Most important of all are its sparkling beauty and crystal clarity. Each Eastman Acetate Sheet container serves as a miniature "showcase" . . . provides all the sales-compelling power of open display . . . and at the same time guards against dust and handling.

Although essential war requirements come first, it is not too soon to begin planning on Eastman Acetate Sheet for your postwar packages. The Kodak Packaging Laboratory is always open to your staff . . . and Kodak technicians are on hand to suggest and advise. We invite you to make use of it. For information, write Chemical Sales Division, Eastman Kodak Company, Rochester 4, N. Y.

BRANCH OFFICES: *New York,* Eastman Kodak Company, 350 Hudson Street. *Chicago,* Eastman Kodak Company, 1727 Indiana Avenue. PACIFIC COAST DISTRIBUTOR: Wilson & Geo. Meyer & Co.—*San Francisco,* 333 Montgomery Street; *Los Angeles,* 816 W. 5th Street; *Seattle,* 1020 So. 4th Avenue. CANADIAN DISTRIBUTOR: Paper Sales Limited—*Toronto,* 11 King Street West; *Montreal,* 1559 Sun Life Building.

ACETATE SHEET

XUM



FOR THE

Fifth time

COLT'S APPROACHES A

POST-WAR PERIOD!

POST-WAR planning has become a habit with us. The story of our past, successfully spanning over a hundred years of war and peace, is assurance that the Colt Company is looking forward with confidence and well-laid plans★ to the privilege of catering to the Future's inevitable demand for new and better things in Plastics.

★ *These plans include new, exclusive methods, new materials, and new and improved facilities.*

TODAY WE OFFER YOU A COMPLETE PLASTIC SERVICE—

Chemical, Art and Design, Engineering, a skilled Tool and Mold-Making Department, and an outstanding Manufacturing Organization.

Backed by the prestige of a hundred year old Company, and rich in the experience of twenty-three years as specialists and pioneers in the plastics field, we feel certain that we can help you toward the successful accomplishment of your plans for plastic products.

THE PLASTICS DIVISION

COLT'S PATENT FIRE ARMS MFG. CO.

HARTFORD **CONNECTICUT**

SHATTERPROOF SEAMLESS

Plastic CONTAINERS



ALL COLORS
TRANSPARENT
or
OPAQUE

with OUTSTANDING Advantages

Your label processed during production. These beautifully colored, eye-appealing *plastic* containers survive handling because they are *resilient*. They permit product-visibility with shatterproof, seamless protection against either breakage or shop-handling. *They keep new things NEW*, with a style and quality that has long been associated with containers of

Clearsite*

for DRUGS —NOVELTIES—HARDWARE—MACHINE PARTS
INSTRUMENT PARTS—PHARMACEUTICALS—TOOLS
SURGICAL or DENTAL PRODUCTS—DRY CHEMICALS
TOYS —SPORTING GOODS—FINDINGS—COSMETICS —ETC.

* Registered U. S. Pat. Off.

Set Your Products STYLED—with Clearsite® PROTECTION

TECHNICAL STAFF and PACKAGE DESIGN ENGINEERS AT YOUR SERVICE

CELLUPLASTIC CORP.

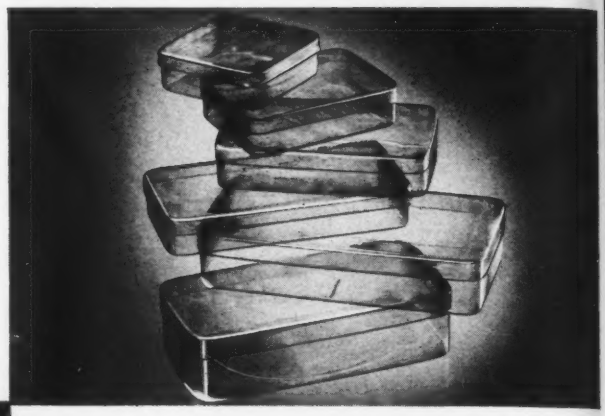
CELLUPLASTIC CORPORATION

38 AVENUE L NEWARK, N. J.

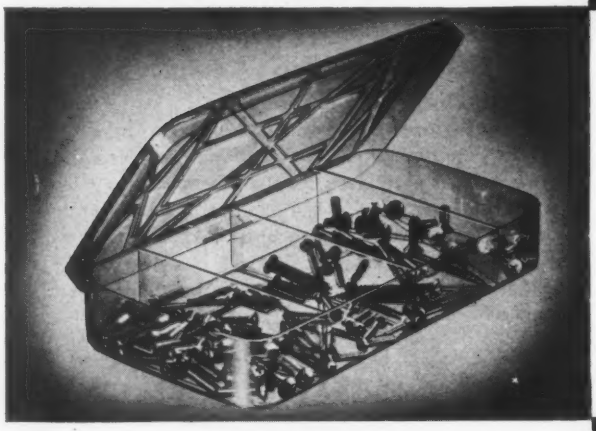
WEST COAST REPRESENTATIVES: CONTAINER SERVICE CO., 1266 North Western Avenue, Los Angeles 27, Cal.

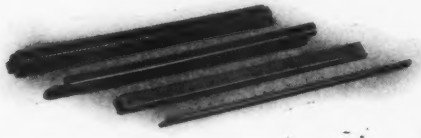
Better PLASTICS FOR *Better* PACKAGING

Look to "Great American" for help in plastics for packaging or displays. Our wealth of experience — our endless variety of plastic processes and professional "know how" are always at your command. Check these types of plastic processing for YOUR needs — then wire, write or 'phone GREAT AMERICAN.



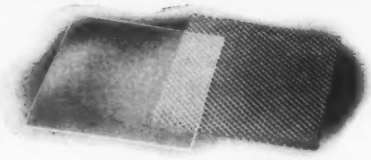
Drawn transparent plastic boxes — with or without special compartments. Used widely by Army, Navy, Marine Corps and Industry. Peacetime possibilities are only limited by your merchandise.



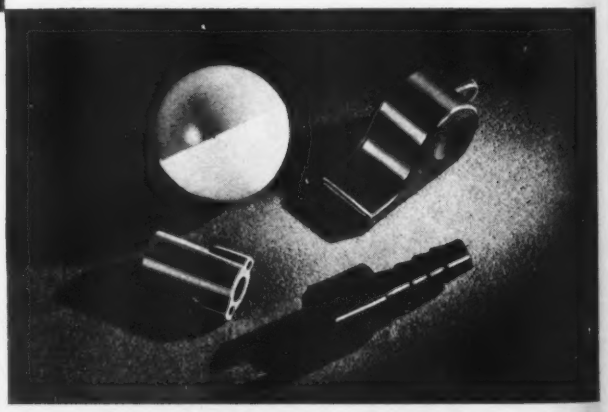


Extrusion rods and tubing — available in an endless variety of shapes and diameters for packaging and displays.

Another form of drawn box — now widely used for small parts — sub-assemblies — screws and bolts—even for "Fishing Tackle."



Sheet plastics. Opaque — colored or clear transparent—plain or in three dimensional embossed patterns integrally applied.



Molded Plastics — representative of just a few of the shapes — sizes and color combinations possible with our up-to-date molding machinery.

NOTE — End use must be allowed under W P B allocations for sample requests and orders to be filled.

THE GREAT AMERICAN PLASTICS CO.

• INJECTION • EXTRUDING • BLOWING • FORMING • SHEETS • ROD-TUBES AND SPECIAL SHAPES •

TELEPHONE: LEOMINSTER 2500 **LEOMINSTER, MASSACHUSETTS** TELETYPE: LEOMINSTER 295

NEW YORK CITY SALES AGENCY: 27 WEST 20th STREET CHELSEA 3-0267-8



Distinguish a Brand by Its Cover

CAPS, CLOSURES, ROUGE BOXES, and other specialties for the cosmetic trade in Injection and Compression Molding or fabricated to your specifications.

THE FAMOUS FONTAINE LIPSTICK CONTAINER... A swivel-type thermoplastic container with fine features, specially designed for firm, smooth ejection.

SILK SCREEN AND GOLD LEAF PRINTING; also lacquer spraying on plastic, wood, glass, etc., in gold, silver and gay colors. Both flat and round surfaces can be decorated.

FONTAINE
FONTAINE PRODUCTS COMPANY
• *Art in Plastics* •
306 EAST 61st STREET • NEW YORK 21



Here is a photographic story of LUSTEROID'S light weight. Three of these smart containers weigh the same as one of the former packages replaced by LUSTEROID.



With LUSTEROID, your design and sales message are reproduced in full color to become an integral part of the container. No labels to buy or affix.

DISTINCTIVE LUSTEROID VIALS AND TUBES DISPLAY AS WELL AS PROTECT

Here is a proved method of packaging that does two vital jobs in one:

1. LUSTEROID displays your products through its crystal-clear walls for eye-and-buy appeal.
2. LUSTEROID'S strength, rigidity and "unbreakability" protect your products from damage and soil in shipment, at point of sale and in use.

These plastic containers save time, work and money. Their inherent strength eliminates the need for protective packing in shipment. Their printability means no labels to affix. Their light weight cuts shipping costs.

LUSTEROID comes in all colors of the rainbow—clear or opaque—with cork, slip-on or screw-cap closures. Standard diameters from ¼" to 1¼" and lengths up to 6".

For safety, smartness, savings and sales, merchandise and protect your products in LUSTEROID.

Write for post-war details

LUSTEROID CONTAINER COMPANY, INC.

Formerly Lusteroid Division of Sillcocks-Miller Company

Office and Factory: 10 W. Parker Avenue, Maplewood, N. J. • Mailing Address: South Orange, N. J.

A SHORT GUIDE



TO BETTER PACKAGING

DOW

Saran Film

KEEPS MOISTURE IN ITS PLACE



Dow-developed protective solves the moisture problem

The question "What packaging film shall I use?" should be answered by the selection of that material which most nearly fits *all* specific needs. Tough, flexible Saran Film* has been developed by The Dow Chemical Company as a transparent packaging medium of "balanced" characteristics. And it has the especially valuable ability to "keep moisture in its place" over unusually long periods. Whether moisture is to be kept out of the package or retained inside, Saran Film is provedly superior, even under the extremes of climatic conditions encountered in present-day global transportation activities. As time goes on, more and more packaging users and fabricators will avail themselves of the numerous features offered by Saran Film.

*TRADE MARK REG. U.S. PAT. OFF.

HOW AND WHERE TO USE SARAN FILM

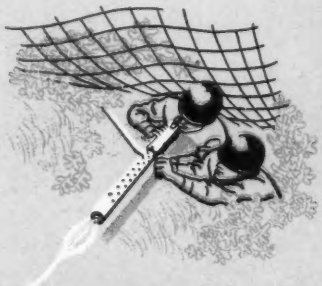


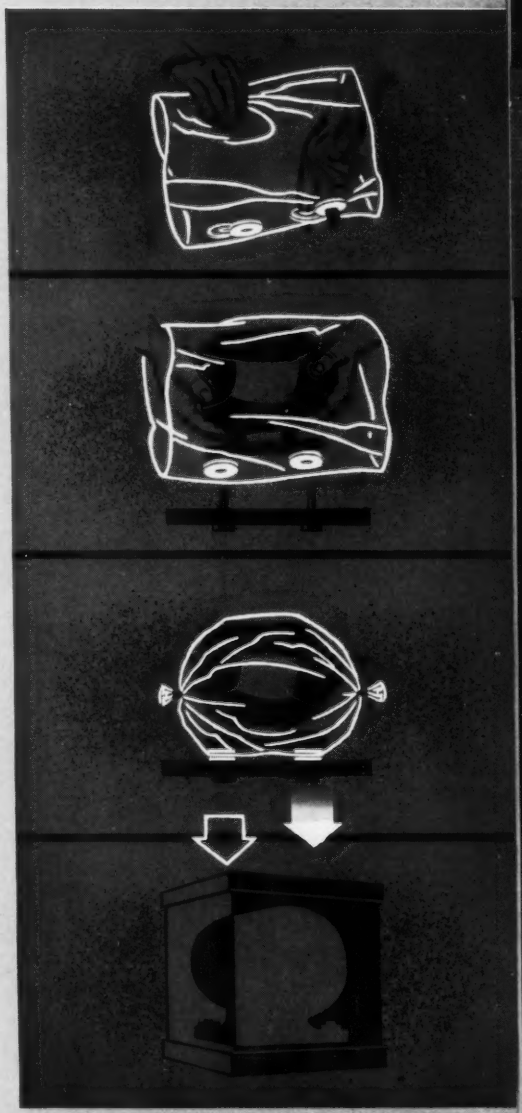
The packaging technique designated as Method II (illustrated), requires the use of the right *methods* and the right *materials*. The efficiency of a correctly engineered package is only as good as the moistureproofness of the film barrier. In keeping moisture from the product, Saran Film is three times more effective than the next best comparable plastic material . . . it affords complete protection for an exceptional length of time . . . and it ordinarily requires only one-quarter the amount of desiccant needed with similar protectives.

While Saran Film is being devoted outstandingly to the protection of precision metal parts, constant research is suggesting great opportunities for widespread usage of its individual advantages in varied packaging fields where freshness of product and the appeal of appearance are important considerations. Laboratory tests indicate Saran Film to be ideal for those who take pride in guaranteeing that the quality of their product has complete protection up to the very moment it reaches the consumer.

SARAN FILM PROPERTIES AT A GLANCE

Saran Film is a thermoplastic . . . basically a vinylidene chloride resin. It is extra tough, clearly transparent . . . flexible, even at low temperatures . . . free of fire hazard. Its notable ability to "keep moisture in its place" is retained—even improved!—with age. And Saran Film is highly resistant to the attack of almost every chemical combination: acids, alkalis, organic solvents, salt solutions. You are invited to consult Dow regarding additional details.





An example of Method II packaging—From top down: Saran Film moistureproof "Floating Bag," seamless, with bolt-holes. . . . Electric motor, to which desiccant is attached, is inserted in enclosure and bolted to platform, thus eliminating all stress on bag; gaskets around bolt-holes protect film and form moisture-tight seal. . . . Envelope ends sealed, in this instance by lead rings. . . . Finished package provides external protection for "Floating Bag" and product.

Dow



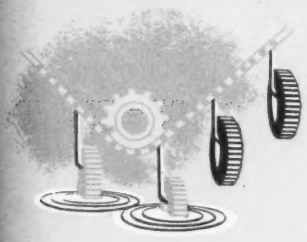
Hot melt dip protects metal products

Stripcoat* is one of the important advances born of the necessities of world-wide war. This Dow product is a tough, efficient plastic "skin" used in the shipment and storage of parts and assemblies of metal and part-metal fabrication. *Complete* protection against corrosion and rough handling is provided merely by dipping the part in a hot melt of Stripcoat. This single simple operation saves labor, time and cost. And Stripcoat removal, too, is handily accomplished by peeling, leaving the part ready for instant use.

Because of the limitless opportunities suggested by these fundamental advantages, Stripcoat has assumed a logical place in the plans of packaging users in many fields of industry. For, with Stripcoat, it is merely "Dip it—Ship it—Strip it."

*TRADE MARK REG. U.S. PAT. OFF.

HOW AND WHY STRIPCOAT IS USED



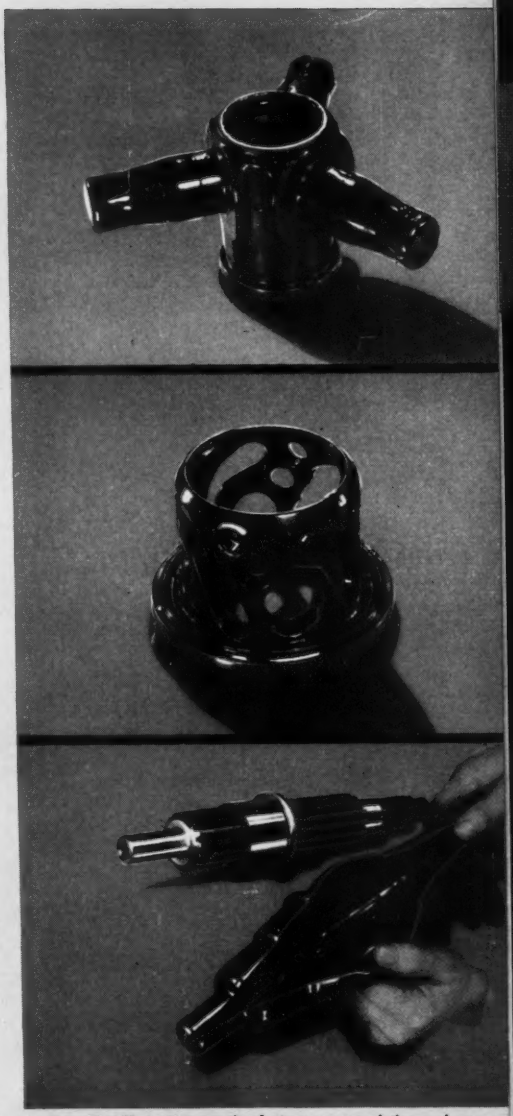
The technique used with Stripcoat consists simply of hand- or machine-dipping a cleaned metal part (such as the aircraft propeller hub parts and gear illustrated) in a 350° to 375° F. pure Stripcoat melt. The cool metal absorbs heat from the adhering coating which sets within a few seconds in ordinary room atmosphere: no quenching or special drying equipment is needed. The result is a tough, uniform, resilient "skin" that is highly resistant to rubbing and scuffing; when parts are stacked or piled, it will withstand considerable weight pressure without puncture by the metal. It is rupture-proof under expansion and contraction of the metal in extreme temperatures. At destination, or following even long periods of storage, Stripcoat is easily slit with a knife and stripped off.

In actual use, Stripcoat has made possible an average saving of 80% in man-hours, and has provided substantial new efficiencies in various phases of metal protection.

STRIPCOAT PROPERTIES AT A GLANCE

The essential ingredient of Stripcoat is Ethocel (Dow Ethylcellulose). This inherently tough thermoplastic affords protection to polished, machined and rough metal surfaces, but will not adhere to itself. It is abrasion-resistant to a marked degree. Stripcoat's protective qualities are retained from −30° to 150° F., and it will withstand 100% Relative Humidity at 120° F. Water- and corrosion-proof, it is also highly resistant to salt solution. Dow offers further technical data upon request.





The illustration on the facing page and those above show typical aircraft parts after dipping in Stripcoat. Picture immediately above illustrates Stripcoat protective "skin" which has been slit for easy stripping.

DOW

XUM

Ethocel Sheeting

FLEXIBLE AND TRANSPARENT



Rigid transparent packaging with smart sales appeal

In the past many packaging users have been inclined to look upon all transparent rigid plastic sheeting as being substantially alike. But as the use of this type of material has expanded, it has been demonstrated in actual performance that Ethocel* Sheeting—Dow Ethylcellulose—for very specific reasons is truly outstanding. Its strength and ductility . . . its essential property of retaining all its serviceability and fresh sales appeal under the most adverse conditions of handling and shelf-wear and temperature extremes . . . the practical ease with which it is formed . . . the wide variety of its possibilities for shaping and conjoining . . . the low cost of its fabrication—all these advantages, plus many more, mark Ethocel Sheeting for successful use where other materials may fail.

*TRADE MARK REG. U.S. PAT. OFF

HOW AND WHERE TO USE ETHOCEL SHEETING



The general uses of rigid transparent sheetings are well known. They are utilized in widely variegated types of merchandising and protective packaging, ranging from humidity indicators to rare orchids and other delicate products requiring both visual and protective aid. In a great many instances Ethocel Sheeting offers qualities and advantages not found in any comparable sheeting substance.

ETHOCEL SHEETING PROPERTIES AT A GLANCE

Ethocel Sheeting, cast from Dow Ethylcellulose, is excellent in both impact and tensile strengths, and remains unchanged within a range of temperatures from −70° to 250° F.! Its inherent pliability permits bending, forming and deep-drawing into seamless ovals, circles, hemispheres, oblongs; and cylinders can be drawn to depths as much as two-thirds the diameter. Ethocel Sheeting can be continuously beaded, crimped, scored, creased, or folded through beaded edges. Cementing, riveting, sewing and stapling are all cheaply practicable. When subject to any of these operations, Ethocel Sheeting will retain intact all the appeal of its brilliant luster and fine clarity. Under long exposure to strong light in show-windows or display counters, Ethocel will not discolor or become brittle. It will take printing in any ordinary technique, and it can be finished in high gloss or rich matte, in an extensive range of colors, in translucent or opaque forms as well as transparent. Complete information relative to Ethocel's application may be had by writing Dow.
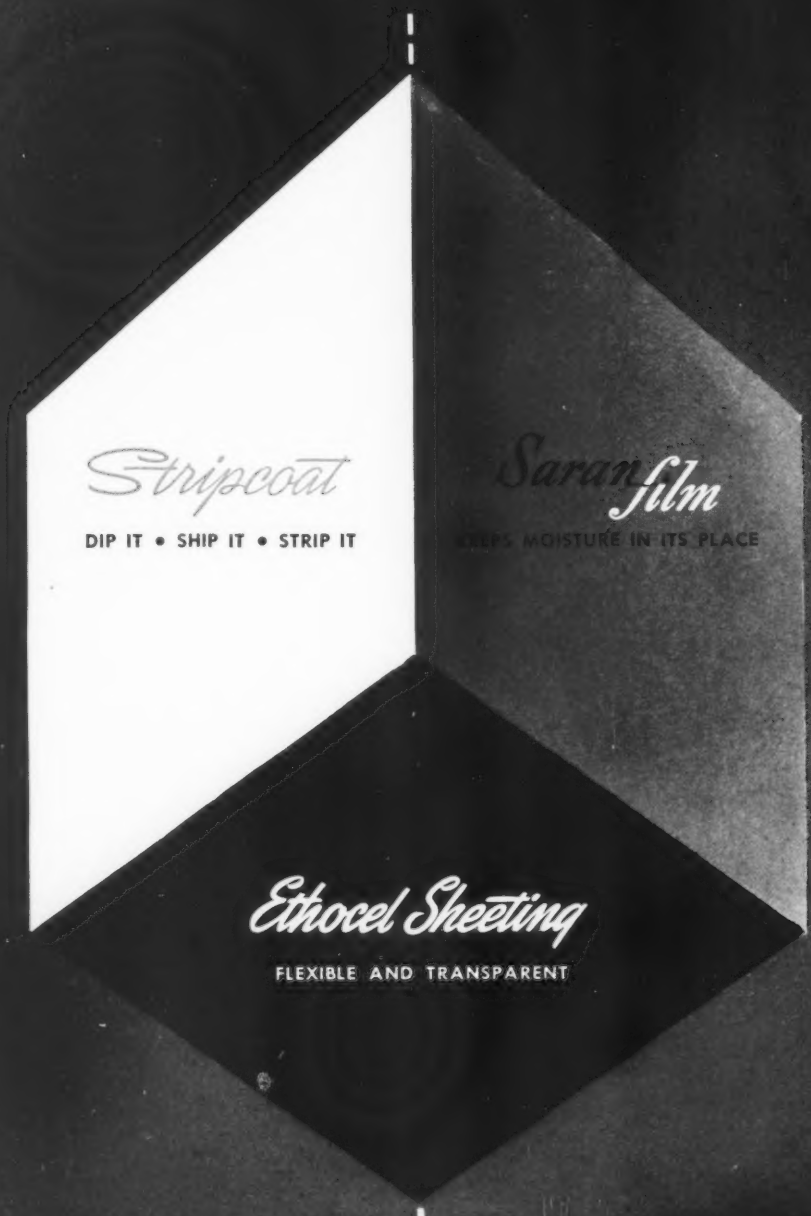




These examples of Ethocel Sheeting fabrications illustrate uses of such operations as beading, cementing, printing, and combining with other materials. The humidity indicator (bottom) is a practical application of Ethocel Sheeting, often used as an additional safeguard in Method II packaging (See Saran Film section).

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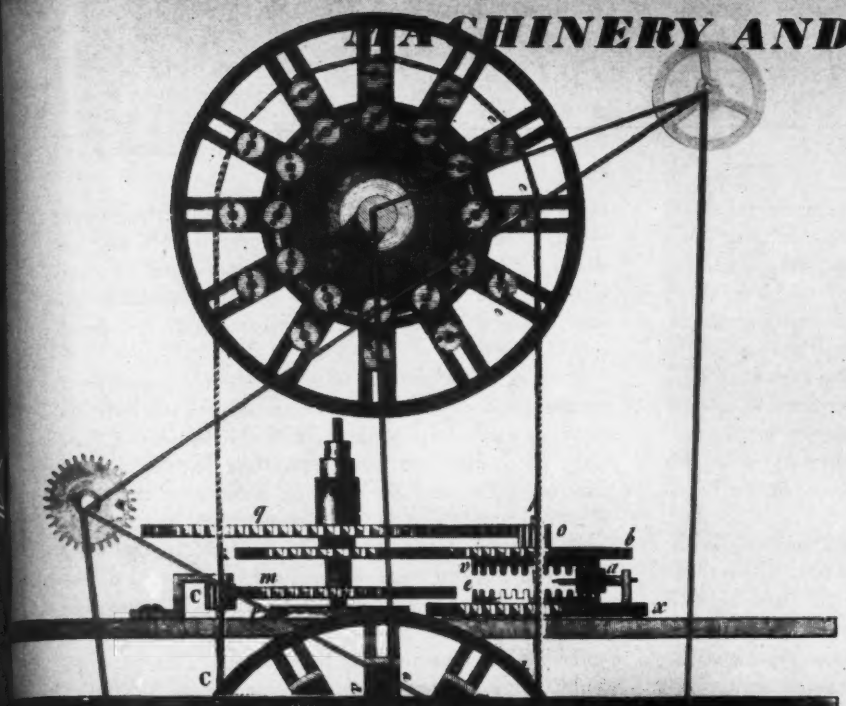
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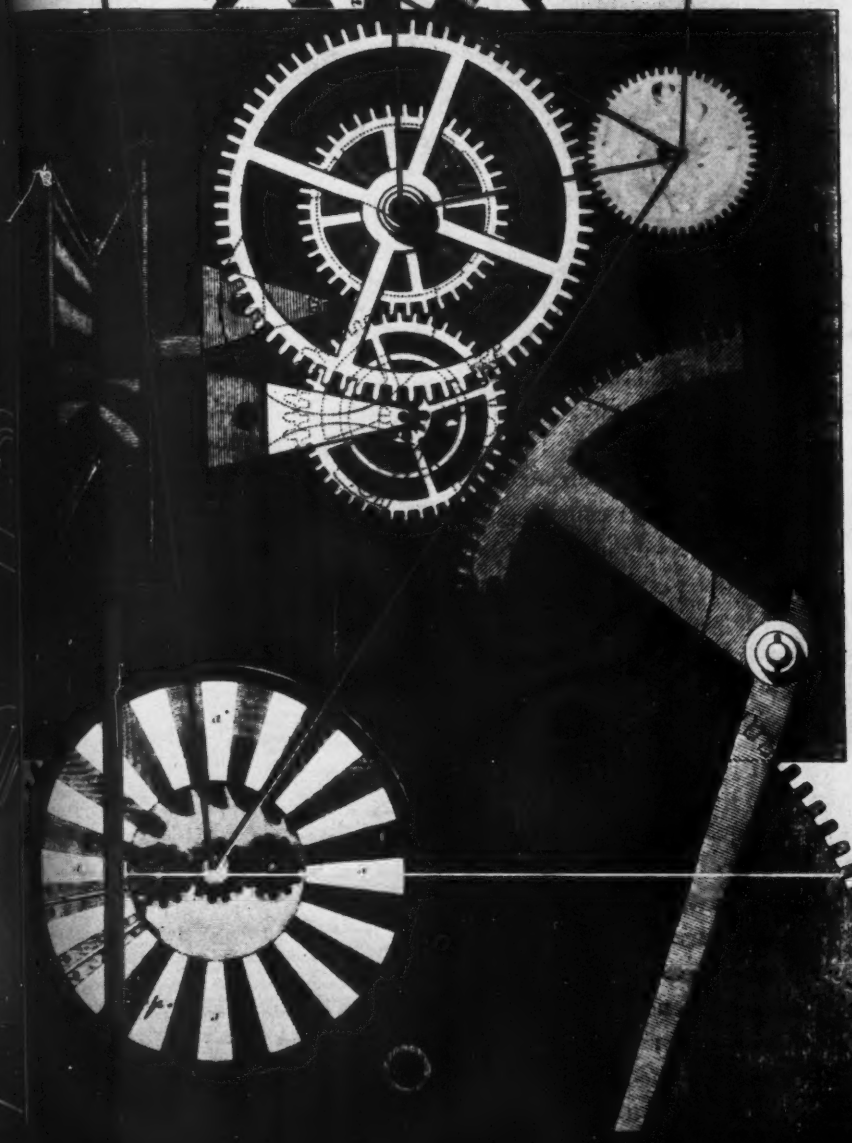
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FACILITIES BELONG TO OUR FIGHTING MEN;
they must have the vital war equipment, the necessary supplies—the continued solid backing from every American war plant. Yet, there is a day approaching when those boys will be coming back—the day when they may return home to enjoy fulfilled dreams of all that their post-war America holds in store for them. America must be ready for that day. Yankee ingenuity responsible for the successful apparatus of this war must convert principles of this apparatus into undreamed of tools of peace and essentials for the greatest peace era the world has ever known. Such is the challenge facing American industry today and it has been squarely met with plans laid down in true democratic spirit. Yes, America will produce the standard of living a freed world of people are waiting for—come the dawn of peace. ★ ★ ★
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A BETTER WORLD
Our design and engineering departments are hard at work on post-war plans for many manufacturers. Possibly they may be of help to you. Packaging in plastics has become essential today—paramount tomorrow, whether it be for jewel box or Army Air Corps sextant case. We suggest that you write for illustrated information regarding the triplex patented spring hinge which is integral with all Rathbun hinged plastic construction.
Rathbun MOLDING CORPORATION
SALAMANCA, NEW YORK

MACHINERY AND EQUIPMENT





Mechanization principles 630

Principles of plant layout 632

Weighing and filling dry products 63

Check-weighing scales and devices 63

Bottle cleaning equipment 64

Filling liquids and pastes 64

Capping and sealing equipment 647

Labeling machines and devices 651

Wrapping equipment 654

Tight-wrapping equipment 660

Heat-sealing equipment 662

Carton loading and closing equipment 667

Collapsible tube filling 669

Bag filling and sealing 671

Inspection on the production line 673

Box and bag stapling equipment 675

Case packing and sealing equipment 677

Wire-stitching machinery 678

Materials-handling equipment 680

Graphic arts equipment 684

Coating and embossing equipment 688

Laminating equipment and methods 689

Maintenance problems 693

Mechanization principles

by C. H. Lambelet

There is no way of anticipating all the problems which will arise during the inevitable period of rebuilding, when peacetimes are realized, and industry has returned to competitive operating activity. Nevertheless, consideration of likely possibilities is imperative for those who would be prepared to cope with situations as they arise.

Economic principles lead us to believe that mass production methods in the packaging of merchandise will be in greater demand than ever before. Mass production implies mechanization. How is this eventuality going to affect those industries which have been employing hand or semi-automatic operations?

The problem of whether or not a manufacturer should risk mechanizing his production lines as soon as possible is a serious one in each individual case. A major investment in equipment will undoubtedly have to be made. If this step is taken, there is no positive assurance that it will be possible to operate efficiently, thus the equipment may become "dead wood." On the other hand, if the proper type of equipment is not installed, the industry may be seriously handicapped by inadequate elasticity in productivity, and by an improper balance between personnel and equipment. It is difficult to judge at what exact point mechanization is advisable.

If one takes into consideration the various types of equipment which are used in packaging today, whether it be wrapping, cartoning, casing and sealing, liquid or dry filling, tube filling, capping, labeling, etc., the possible combinations of these various types and the varying conditions obtaining in different plants makes the question even more complex. The factors and conditions and problems which should be considered in switching from a hand operation to a mechanical one follow.

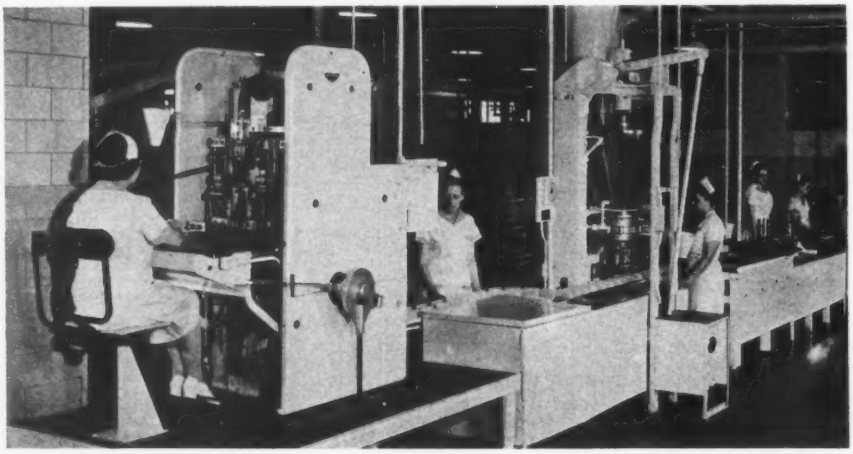
How about the package?

First, forget production. Strange as it may seem, the first factor to determine is whether or not the package lends itself to mechanical handling. Because irrespective of the levels production might reach, if that package which at the present time is being fabricated by hand methods does not lend itself to machine handling, the installation of equipment might become more of a headache than a help.

As an example, here are two cases wherein a machinery company was asked to supply equipment for two different packages which were handled manually. In both of these cases, production warranted equipment but the type of work which the machine would be called upon to do was of such a nature that in one case there was (and is) no machine which could handle the job and in the other there were but two types of machines which could do the work. In either case, as the packages came off the machine they would have to be rehandled manually in order to correct the defects which, due to the design of the package, would necessarily occur.

In designing a package, even though one may contemplate handling it manually, it should be kept in mind that at some future time it might become so successful as to warrant handling it mechanically. For instance, if it is a glass container, the glass supplier should be told that possibly at a later date this package is to be handled mechanically and asked to determine whether its design will lend itself to such handling. As an example, the throat or neck of a bottle might be such that, while no difficulty would be encountered in filling it by hand, when handled on an automatic filler, the size of the opening, the length of the neck, in fact, its very shape, might prevent the user from getting the full productivity of the automatic machine. It might be too top-heavy to convey readily; its contour might cause it to "climb" or "lock" on the conveyor chains, or its shape might not lend itself to accurate registration in labeling. These, and many other factors might make mechanization inadvisable.

Machinery is still machinery and while its functioning is almost human at times, still there are certain human



1

1—At this plant of the Kraft Cheese Co., the machine line installed by Frank D. Palmer, Inc., forms the inner bag and carton which comprise a package, fills the inner bag with melted cheese, seals the bag and encases it in the carton, and conveys these units to the bundler for wrapping.

attributes which cannot be built into it, of which, possibly, a most important one would be the faculty or ability to compensate for continually varying conditions.

The bottles might vary 1/8 in. in width. This does not mean anything to the hand operator, but can cause troubles in equipment. Labels might vary 1/8 in. in dimensions and still the hand operator will center them on the bottle and make a perfectly acceptable package, whereas in a machine operation the location of the labels will vary or even "skew" with resultant unsatisfactory appearance.

When changing from manual to mechanical operation, in order to give the user full benefit in productivity with consequent savings, equipment has to be catered to and given accurate material to handle. While the machinery manufacturer realizes that he cannot count on receiving perfect packages and package parts and while he can compensate for a certain amount of inequalities in materials and still have his machine produce acceptable packages, yet the limitation of his equipment is much greater than that of human hands.



2

2—Some products can be packaged better with semi-automatic lines than with fully automatic machinery. This illustration shows a line where hand operations have been successfully combined with automatic filling and cap pressing for greater efficiency. Photo, Stokes & Smith Co.

Hands or machines?

Every packaging machinery manufacturer has come against this problem and it is not always easy to convince the prospective user of equipment that greater care must be taken in the materials when handled mechanically instead of manually. However, it is all a question of educating the package suppliers and the packager's own employees. When once this fact has been drilled into them there is no great difficulty in supplying material acceptable to the machine.

When contemplating the mechanization of an operation which previously has been done manually and when contacting the machinery builder, it is best to allow him to criticize frankly the materials that are being used. While the first reaction might be that any changes suggested are for his own benefit, one should consider that he is trying to eliminate headaches which he can foresee in a package. The machinery builder eliminates them for the user and makes his equipment a profitable investment for his customer. He is far-seeing enough to realize that the first sale of equipment might possibly be the beginning of a further friendly business relationship and one which would be advantageous for both sides.

Even if suggestions which are made might cause additional expenditures for material, in the vast majority of cases the benefit which will derive from mechanization will more than offset these.

Semi-automatic or automatic?

Another difficult question to decide is whether semi-automatic or fully automatic equipment should be installed. To answer this question is practically impossible as the conditions in each plant vary. This should be determined by a study of the individual case rather than by some hard and fast rule.

While many manufacturers at times or during certain portions of the year, could use fully automatic equipment, they have found it more economical and wiser to have semi-automatic equipment in conjunction with an efficient conveying system. At such times they so set up their semi-automatics in conjunction with the conveyors to form what might be called a "semi-automatic-automatic" line. Such an arrangement has many possibilities, is elastic and can be changed to serve varying conditions as they arise. In these cases, skids can profitably be installed in the form of channels or "I-beams" under the machines so that they can be readily moved by means of lift trucks and placed where desired.

Management plays a very important part in the efficient operation of equipment. Methods that are being efficiently used, with reference to routing or handling the product for manual packaging, might be the most uneconomical as far as machine operation is concerned.

Equipment not only lives with the purchaser, but he must learn to live with it. The installation of a conveyor belt will very often repay many times the discarding of trays or racks formerly used. In catering (and the word is used advisedly) to machines, one should not be afraid to spend money wisely.

More people or more machines?

Another factor enters into purchasing of equipment. For example, a product is successful, and in order to have enough production, more hands must be hired. Floor space does not allow this. However, by proper choice of mechanization, even if only operating part time, the question of seeking new quarters, increasing fixed charges, costs of moving with its inherent effect on production, possible loss of old and trained employees, can be eliminated. There need not necessarily be an increase in the number of employees. All of this should offset the possible necessity of employing a mechanic to take care of the equipment.

On the question of mechanical supervision, it should not be forgotten that the machine which is working in the plant requires a certain amount of attention, of oil and grease, of cleaning and, in general, the same care as one would give an automobile.

Principles of plant layout

by G. Winckelmann

American defense plants are characterized by their efficiency in mass production. Much of this efficiency is owed to the system of continuous line operations employed throughout the country. In facing the task of rebuilding civilian industry, it is advisable to give this successful system due consideration, and to capitalize as far as possible on its advantages. And what is this continuous line production? To put it simply, it is "producing the mostest, the quickest with the leastest."

The continuous line principle can apply to practically any product, from airplanes, tanks, automobiles, etc., in the heavy field, down to the smallest items in the food and drug field—all sold in packages. The principles involved are the same, namely, the even and uninterrupted continuous flow of the material to be fabricated, processed or blended into the finished product ready to be marketed.

We are particularly interested in continuous line or mass production as it affects articles of food, drink, drugs, etc.—that is, small cans, bottles or packages eventually placed on shelves or display for retail distribution.

It is a far cry from the old days of bulk sales, and what was accepted by our grandmothers as the usual way to purchase groceries, drugs, etc., would seem strange to us today since we are accustomed to buying almost everything packaged.

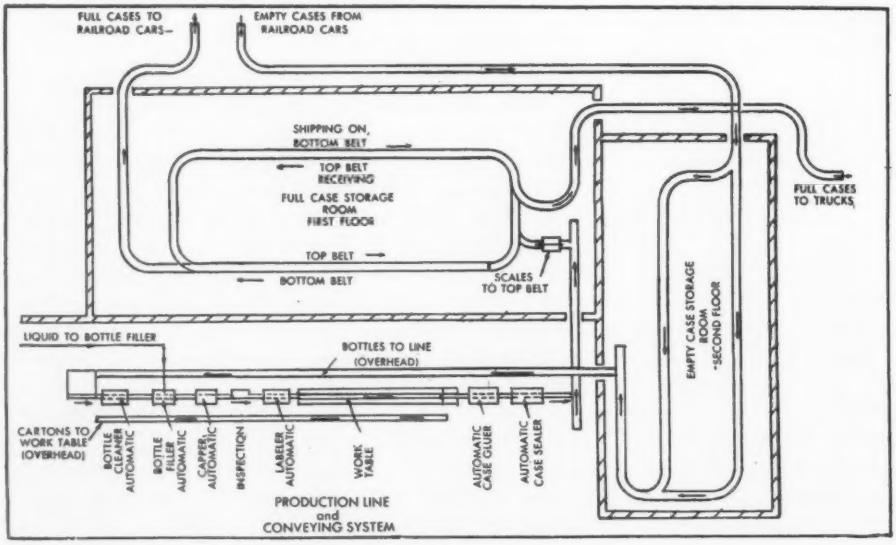
The change in marketing methods did not just happen overnight, but instead was a rather slow process over a period of years. "Centralized packaging" was originally performed by hand, then simple machines, mostly semi-automatic, were invented to supplement hand labor; then machines were invented that did a fully automatic job. As time went on, these were improved upon, and American genius developed machines that can now do most everything but talk (this is no doubt good, for otherwise the machines might complain that they are overworked and want to go on an eight-hour shift with time and one-half for overtime). If there is no machine to do a particular job, the machinery man will no doubt invent one to meet the needs.

Many people, when thinking of line or mass production, have in mind only that part of the operation that does the actual canning, bottling or packaging of the product. This notion is not sufficiently comprehensive. Line production should be all-inclusive, from the receipt of all raw materials to be processed, blended or whatever is necessary, the receipt of all cans, bottles or packages to be used, to the final disposition of the product in the case —ready for shipment. Otherwise full advantage will not be derived from the possibilities offered by line production. No hard and fast rule can be set up for laying out high-speed mechanized production lines. Each installation presents its own individual problems.

The building to house the operations may be of multiple or one-story construction, necessitating arrangement of operations to fit the space available. If construction of a new building is contemplated, plans may be made to provide for specific needs. Thus, each installation really becomes a custom job to suit individual requirements.

There are, however, certain basic fundamentals which can be applied to all layouts, namely, good continuity and synchronization of all equipment to eliminate bottlenecks and gaps, to ensure a steady uninterrupted flow of the material, the packages and the finished case.

Starting with the raw materials to be used, whether they be in liquid or bulk, provisions should be made for handling expeditiously their unloading and elevation to storage tanks or bins on the upper floors so that, as the material is required in process, it can flow to the blending



1

1—An ideal layout for synchronized production line and conveying system in a bottling plant. Similar efficiency can be achieved for other industries by the adoption of the principles of straight-line production as indicated.



2—General view of the bottling floor at Frankfort Distilleries illustrates a characteristic straight-line arrangement of bottling equipment in action. The lower conveyor carries cases of empty glass to be filled while the upper conveyor returns empty cases to the packing end of the line.

or processing vessels, as the case may be, by gravity. Gravity is still the cheapest means of conveying. It eliminates any and all mechanical and maintenance worries—no pumps, no motors—just a pipe line, spout or chute.

Automatic unloading and elevating equipment is available for almost any type of material. In addition to the older types of chain-and-bucket conveyors of various designs, air is now used extensively and efficiently.

If the materials are received in barrels or bags suitable equipment may be found for handling these materials and for elevating them to the upper floor. In this connection, a continuous bag or barrel elevator, taking up comparatively little space, will do a splendid job.

The main point to be borne in mind is the efficient distribution of all raw materials to bins or tanks located so as to permit gravity flow to the mixing or processing vessels, which in turn should be so located as to feed the filling machines—again by gravity.

It is also essential that all supplies and materials needed be convenient to the production line where those operations necessary to can, bottle or package the product are performed. Thought and care should be exercised in planning a layout to bring these supplies to the point where they are required. Again, from the place they enter the building to their place on the line where they are to be used, oldfashioned manual handling should be avoided and, above all, an adequate supply maintained to service the line at the speed the machines are operating. This will eliminate gaps or lost production.

Much can be done in this respect by the use of power. I have in mind a problem I was faced with a couple of years ago. We were receiving approximately 600 carloads a year of empty glass in re-shipper containers which had to be taken to storage on the fourth floor. The method then employed for unloading consisted of skids and lift trucks, loaded in the car, taken to the elevators, transported to the fourth floor, unloaded and returned to the freight car. It took nine men three hours to unload a car, or a total of 27 man-hours. After installing a conveyor system, this same work was done by four men in 1½ hr., or a total of 6 man-hours—a saving of 21 man-hours or $12.60 per car. The conveyor paid for itself in nine months, to say nothing of the other advantages gained by the new method.

Progressive operations

There are self-contained machines for some products, which complete the entire operation necessary. But generally a production line has a multiple job performed progressively, each operation being accomplished by equipment from different machinery manufacturers. Take as an example a line bottling a certain product. We may have the following equipment: air cleaner for cleaning the bottles, filling machine, corking or capping machine, labeling machine, case-sealing machine, etc. With these various types of machines available, the packer or manufacturer still has a job ahead of him in assembling the machines and in forming them into an efficient production

line. For good operation, they must be connected to each other by belt, chain or other type of conveyor, and each machine must be synchronized with the others, to ensure an even and steady production flow.

Most machines have motors built into them, and usually they are equipped with variable speed drives, but still fall within certain minimum and maximum tolerances. It is important to ensure that these speeds are within a suitable range and also that the capacity of the machine itself meets requirements. As a rule, machines have a rated capacity at which they perform most efficiently, but beyond which the quality of the work suffers. It is, therefore, poor economy to buy a machine which can perform required work only by running beyond its rated capacity. This would be like expecting a light Ford truck to carry the same load as a heavy Mack truck. It is far better, having determined to spend money for automatic equipment, to spend just a little bit more to get a machine that meets requirements within a reasonable margin of its capacity. Equipment operated at slightly less than capacity rate will last longer, require less maintenance and do a better job than if it is overtaxed.

Planning a good layout from the receiving of raw materials and supplies to the actual packaging of the product and its packing into the shipping case is not enough. The shipping case must be delivered to the storage room or shipping platform with the least effort so as to complete efficiently the entire chain of operations. If possible, the handling of cases on skids or wheel trucks should be eliminated. This method usually makes for breakages, especially if the floor is rough or uneven. Some system of conveyors should be installed which will deliver the finished case to its final destination for storage or shipping, as the case may be. In this respect an "in transit" power belt conveyor will be of material help. This conveyor could pass through the storage room. Immediate shipments would remain on the belt to pass on to the shipping platform, and cases to be stored would be removed and later put back on the belt for shipment.

A merry-go-round system of conveyors in glass storage or in products storage rooms is helpful and can be used to very good advantage. In planning an entire layout, adequate consideration should be given to each and every detail, no matter how small. I have seen installations which were very good—in part—but which were sadly lacking as a complete set-up. Apparently the person responsible was particularly interested in just one phase of the operation—and as long as that part suited him, he was not so much concerned with the rest of it. This is a sad and, over a period of time, a costly mistake.

How to plan your layout

It is always well to plan for the future. Business may expand and more equipment may be needed. Therefore plans should be made so that additional equipment can be installed without disrupting the original set-up. The space available will usually lend itself to several alternate set-ups, and this can very easily be determined by following a rather simple method outlined below. First, it is advisable to know or to have seen in actual operation the equipment to be installed. This can usually be arranged through the machinery salesman.

Next, a floor plan of the building or floor space available for the installation should be made to a generous scale. Then templates of all equipment may be cut to the same scale as the floor plan. By moving these templates around "checkerwise" the most efficient set-up possible in the space available may be quickly determined. It is far better to make changes on the drawing board—which only requires the erasing of a few lines—than to take things for granted, install the equipment and then find a mistake has been made. The latter may be costly and result in the loss of valuable production time.

In my opinion, any and all time spent on careful planning pays big dividends. It is also well to get the opinion of key employees who will possibly have charge of the new production line. Each and every step should be discussed with them progressively. They may be able to offer worthwhile suggestions which might mean the elimination of certain operators or combining certain jobs for a more efficient set-up—or they might make a suggestion which in itself is not important but which leads to other suggestions or thoughts that may be worthwhile. All openings through which these machines must pass to reach their ultimate location must be checked for clearances, especially elevators if the equipment is to be taken to an upper floor. Otherwise it may be necessary to knock out doors and/or windows to get the equipment in. If the machinery man is told of these "openings" limitations, he may dismantle part of the machine to meet conditions.

All this may seem to be of no real importance but, as a matter of fact, it should be a major consideration for any well planned layout. I have talked with people who knew that their production lines were not the most efficient, who would gladly spend the money for new equipment and the revamping of their set-up to bring the operations to a high standard of efficiency, but who felt that they could not lose any production time. There are, no doubt, cases where there would be a loss of production time, but with careful planning, changes can be made which would in no way interfere with current production. The writer has had considerable experience along this very line, and on three different occasions has accomplished a complete change-over without the loss of any production time. If you have the vision, the problem is not difficult.

I have also seen a case where operations were being performed by hand which could be done much more quickly, more efficiently and with less labor with a machine, but where the owner felt that he could not afford the expense necessary to purchase the machinery. This is very shortsighted, for whether the owner admits it or not, he is spending money every day for additional labor, money which would pay for his machine in a comparatively short time. The result is that he keeps on spending, but has no equipment to show for it and no operating savings to look forward to. Thereby he is constantly handicapped in meeting competition. Competition will become very keen when we are again on a peacetime basis. Now is the time to plan for this era, and to investigate what equipment is necessary for maximum efficiency.

Weighing and filling dry products

In consequence of the more rigid standards of weight and fill which are being promulgated by the Food and Drug Administration, the accurate weighing and filling of dry-products containers is becoming increasingly important to packagers. The difficulties of achieving accurate weighing and filling are augmented by the tendency—indicated by recent administrative actions—to restrict package sizes to dimensions far closer to the volume occupied by the contents than was formerly demanded. Such restrictions reduce the orifice through which the package may be filled, make settling of material more difficult and in other ways complicate the physical problem of handling materials. Automatic machinery, however, seems fully capable of taking care of these difficulties.

There are four basic methods of weighing and filling dry materials—accurate filling, gross-weight weighing, net-weight weighing and a combination of accurate filling and gross-weight weighing.

Accurate filling is perhaps the simplest method. The correct quantities of the product are measured mechanically without the use of a weighing device. One way of accomplishing this is to measure by volume. Another is to use a definitely timed or regulated feeding of the material. As long as the bulk of the material remains uniform, good commercial accuracies can be guaranteed on correctly built machines of this type. If, however, the nature of the product is such that it varies in weight per unit of volume, then measuring by this method may not be sufficiently accurate for commercial requirements.

Accurate filling is successfully utilized for such products as scouring powder, jelly crystals, dessert powder, tooth powder, face powder, cut tea for tea balls and granular salts. Many machine units are available which are capable of handling various sizes of packages at speeds ranging from 10 to about 120 per minute.

Gross-weight weighing involves the use of scales which weigh not just the product alone, but, rather, the package and its contents. For accuracy by this method, therefore, there must be a relatively high degree of uniformity in the weight of packages. This may be achieved through the inherent nature of the package selected or it may be accomplished through the use of a package-sorting scale.

The flow of materials from the feed-hopper to the package is controlled by the scale beam on one end of which the package rests during filling. Thus, when the right amount of material is dropped into the package, the scale beam trips a shut-off which stops the flow of the material instantly and passes the package ahead to the next position. To speed up production, particularly on larger sizes of packages, two scale machines are frequently utilized. The first scale fills a bulk load of from $\frac{2}{3}$ to $\frac{9}{10}$ of the total quantity. The final load, weighed to

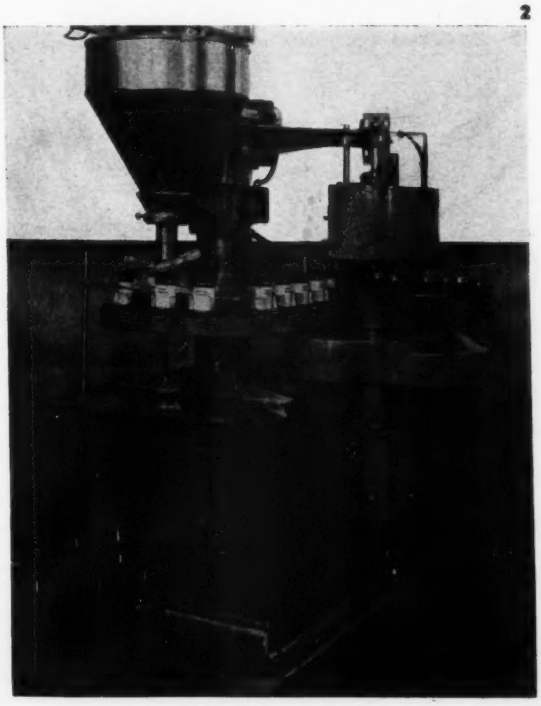
1—A duplex type of automatic filler for dry products, which is equipped with a device for pressing the caps. Photo, Stokes & Smith Co.

1



2—This automatic filling and capping machine comes with a lid transfer and feeding device. Photo, F. J. Stokes Machinery Co.

2





3

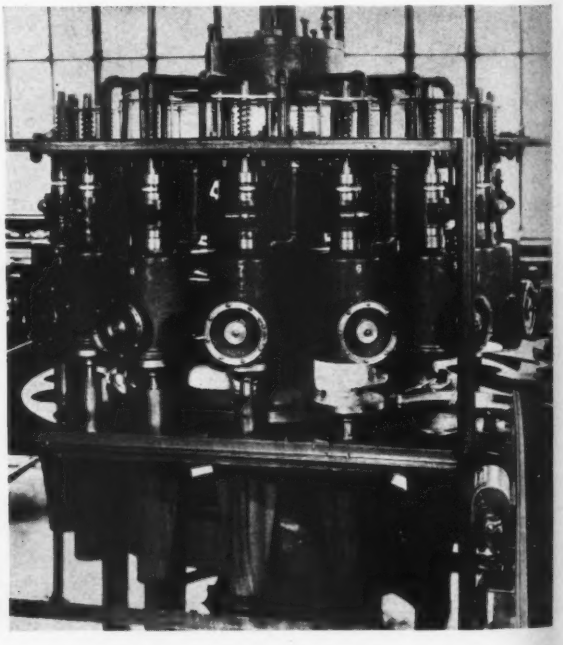


↓5 4



3—Counting and filling machine for tablets, capsules, etc., can easily be adjusted to many types of products and has a count range of 50—1000. 4—Close-up of the filling of fresh cranberries in 1-lb. cellophane bags. Photo, Triangle Package Machinery Co. 5—Equipment for weighing and filling potato chips in 8-oz. and 1-lb. bags shakes bags during filling. Photo, Triangle Package Machinery Co. 6—This 16-head Coffee packaging machine handles paper or metal closures. Photo, Thatcher Mfg. Co.

6



extreme accuracy, is thence delivered to the second scale.

Gross-weight weighing is particularly favored where accurate weighing of non-free-flowing commodities is necessary. Speeds range 10—70 units per minute.

A combination of gross weighing and accurate filling (i.e., measuring) is sometimes used to achieve maximum speed and high accuracy. A typical instance is found in the bag-flour packer where it is further desired to achieve a tightly packed bag. The latter factor makes straight gross weighing impractical. By resorting to a worm packer for the machine's first station, the greater part of the bag's contents can be packed in tightly, at reasonable speed, without weighing. To get weight accuracy, the filling is finished off at one or two subsequent stations by directing a fine stream of material into the bag while it rests on a platform scale.

Net-weight weighing is a system in which the package contents are weighed separately before being transferred to the package. A first essential for this type of weighing is that the product be free-flowing or at least semi-free-flowing. Obviously, this system cannot be utilized if the material is sticky.

On net-weight filling machines, the hopper feeds into a bin arranged on a scale platform. When the bin has received the predetermined weight, shut-off action occurs and the contents of the bin are dumped or otherwise transfarred to the package.

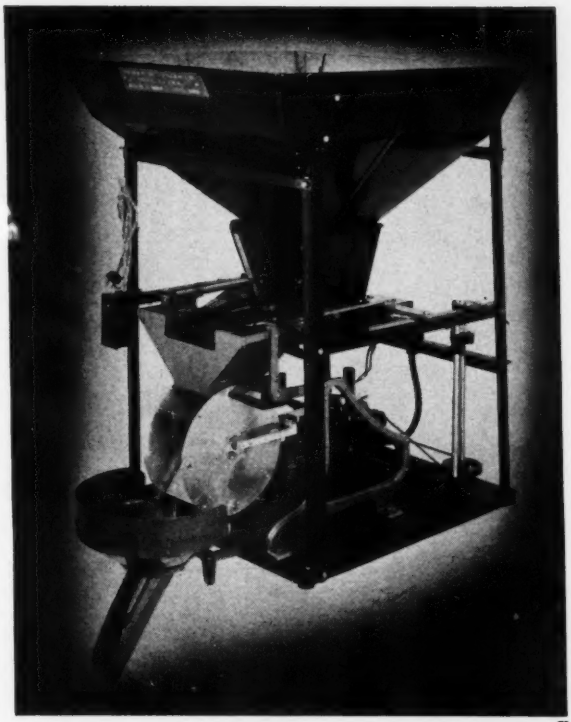
Net-weight weighing is utilized for such products as coffee, salt, tea, etc. Speeds range 10—100 per minute.

A wide range of container types is utilized for dry products, including folding cartons, set-up boxes, fibre canisters, metal cans, glass bottles and jars, etc. Certain basic considerations, however, affect the design of all of these if they are to be successfully and economically filled on standard types of machinery. Thus, for instance, containers with narrow neck openings, which might be suitable for liquid filling, cannot be successfully utilized for packing powders.

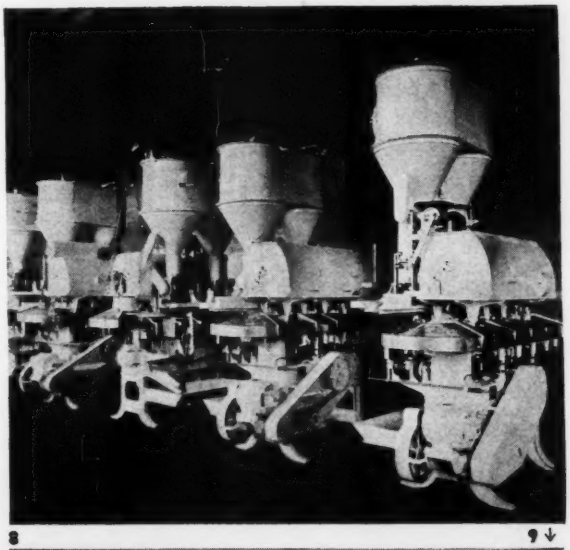
A prime consideration in the selection of any container for powder filling involves the choice of a package with a suitably wide filling opening. Users of fibre-bodied canisters or metal cans sometimes solve this problem by filling through the open bottom end of the container and then seaming on the bottom. The limit of auger diameter is thus substantially increased.

The folding carton and many types of paper bags now offered are well suited for packaging many of our widely used dry products. A number of entirely acceptable styles of each of these basic types of container are available. In either case, careful checking is suggested to determine accurately the adaptability of the product to the particular container selected. Such adaptability will concern protection convenience and sales appeal.

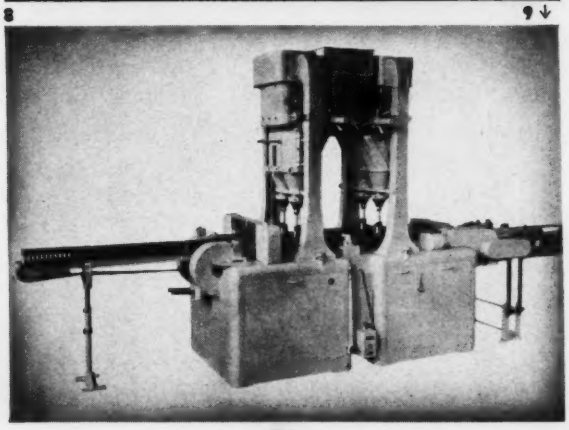
Among the cartons, the sealed-end type with extended flaps is extremely popular for products which are likely to sift. Bags also enjoy wide usage in this familiar field and improved standards in construction and design now assure consideration. *(Continued on next page)*



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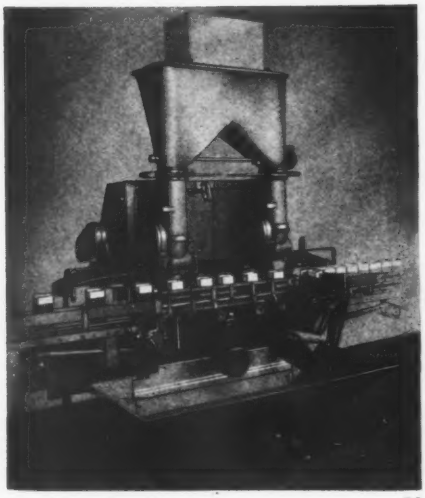
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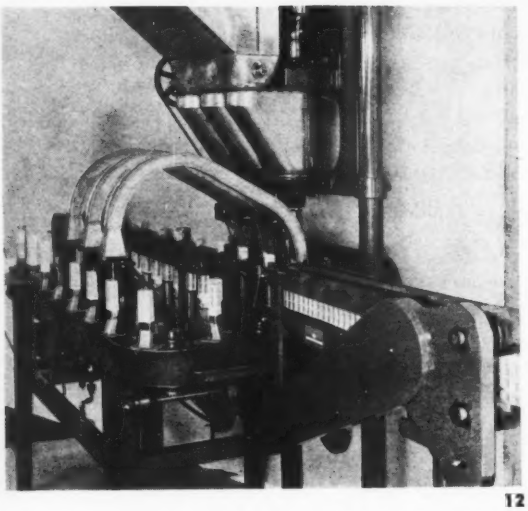
7—Hopper-fed machine for the filling and net-weighing of dry products. Photo, Amsco Packaging Machinery Inc. 8—Gross-weight scales for weighing soap flakes. Photo, Battle Creek Bread Wrapping Machine Co. 9—Packer-weigher which fills carton by automatic packing, volume filling, weighing, or combination packing and weighing at the rate of 120 per minute. Photo, U.S. Automatic Box Machinery Co., Inc. 10—Machine forms, shapes, inserts pouring spouts in cartons. Photo, Seal-Spout Corp.

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11—Fully automatic 2-scale filler for gross-weighing fills free-flowing and non-free-flowing materials. Photo, Pneumatic Scale Corp., Ltd. 12—Carton filler which is equipped with bottom-folding and gluing mechanism. Photo, J. L. Ferguson Co.

Pouring spouts commonly used for such products as salt, sugar and soda, are automatically formed, shaped and inserted into cartons by a newly developed machine. The material for the spout is ribbon-fed and is placed into a shuttle which clinches it to the carton at speeds as high as 110 per minute.

With folding cartons there are certain basic operations to consider. For some carton packages all will be needed, while for others only part are necessary.

1. Carton feeding and forming
2. Bottom sealing
3. Lining
4. Filling or weighing
5. Carton closing
6. Wrapping

The usual practice is to handle each of these tasks on an individual unit, but in some cases it is practical to take care of several on a combination machine.

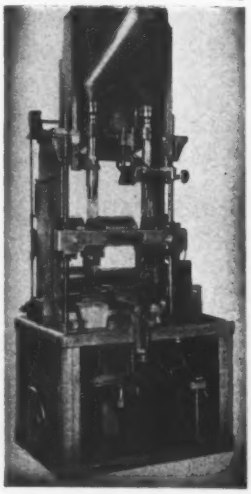
With paper bags current practice embraces automatic approaches comparable to those available for use with cartons. The extent to which these mechanical approaches are utilized is optional with the customer. A typical automatic paper bag line would provide standard types of equipment available for the mechanical performing of:

1. Feeding, opening and registering bags
2. Weighing contents and filling bags
3. Settling and sealing bags
4. Nesting and packing bags in shipping containers

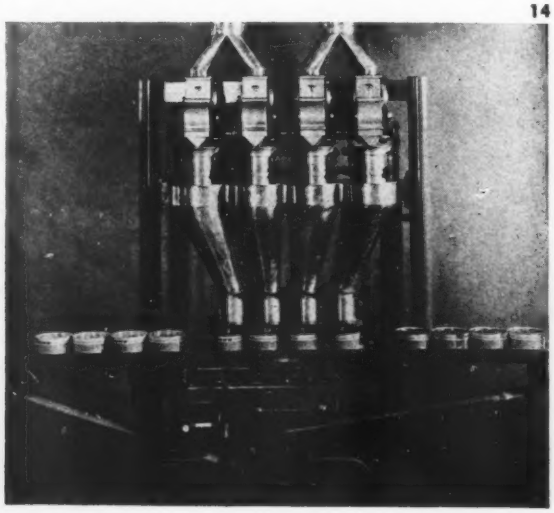
These functions are handled by correlated equipment designed with a particular view toward making progressive approaches from minimum to full mechanization completely practical.

13—Machine forms, fills, seals and severs packets from tube of transparent sheeting. Photo, Stokes & Smith Co. 14—Automatic 4-head net weigher with power feed. Photo, J. L. Ferguson Co. 15—Bulk scale fills ten 100-lb. sacks. Photo, Amsco Packaging Machinery, Inc.

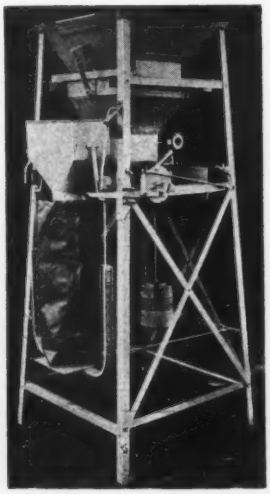
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Check-weighing scales and devices

Accuracy of container fill is, of course, a very essential factor in the packaging operation, and many devices have been developed to facilitate its control. In the selection of packaging and check-weighing scales, it is essential to determine which of a variety of available types is best suited to the weighing job at hand. For example, a scale built with sufficient sensitivity for weighing 10-lb. packages would not have the sensitivity necessary in the case of 1-oz. or 3-oz. packages.

The packager must not only be careful to select a scale of the correct capacity—it is equally important that he choose a scale which has been designed to be used under the working and atmospheric conditions of the plant in which it is to be placed.

The operation of packaging and check-weighing scales should be automatic so that it is easy for operators to determine when the correct weight is reached. Many scales offer a wide indicator travel per ounce, which means that the weight tolerance of the package can be kept down to the mere fraction of an ounce.

Check-weighing scales

For check-weighing smaller packages ranging from fractions of an ounce to 100 lbs., the balance type of scale is most commonly used. The development of an over- and underweight indicator has adapted the balance scale specially well for the production and check-weighing of packages up to 100 lbs. This type of scale can be built to a high degree of sensitivity. is not seriously affected by machinery vibration and weighs correctly in any normal out-of-level position. The scale is simple in structure, does not require very much service and simplifies the process of weighing.

A number of over- and underweight balances have been designed and constructed to take care of various packaged items and to accommodate a variety of types of packaging assemblies.

In all of these models, the scale dial shows the zero reading, which indicates the exact weight point. The dial may also be provided with weight graduations or tolerance marks.

Where weight graduations are employed, the operator or inspector is able to determine the amount of weight error in the package, thus affording a guide in adjusting the filling equipment. If the scale is used for checking different commodities, the dial may be equipped with adjustable mechanical tolerance markers.

For the check-weighing of larger packages, some type of beam scale or a dial scale is generally used. Over- and undeweight indicators have been very helpful in adapting beam scales to packaging needs.

With hand filling, it is of course essential that all packages be weighed. Automatic weighing fillers are subject to occasional variations for reasons which are difficult to control. Periodic check-weighing (every 10th or 100th package, depending upon the nature of the product) is, therefore, usually resorted to as a check of continuing accuracy of fill.

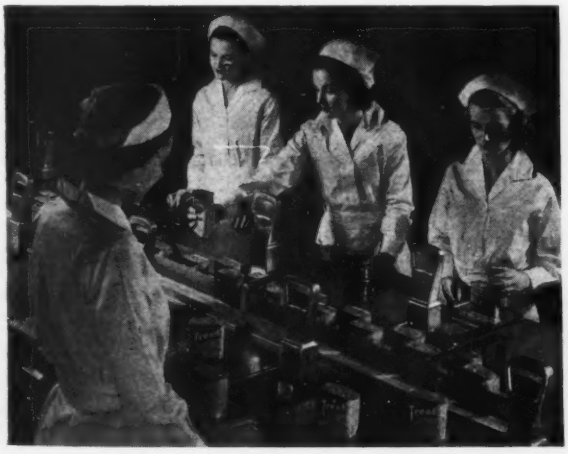
Automatic weight-sorting equipment

In some cases it is desirable to employ automatic equipment to sort packages by weight.

One type which has been widely used is set into the conveyor line so that the packages may be passed over a weighing pan. Each package is momentarily lifted from the conveyor chains for weighing. On the oppo-

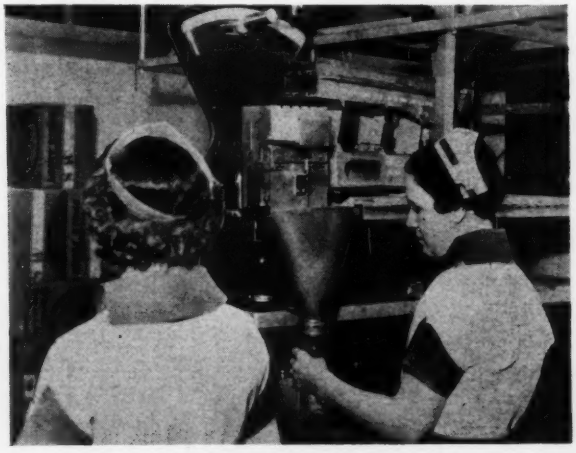
1—For a clean cut and low cost meat canning operation, every can of meat is checked by operators for exact weight on high-speed scales which have end towers. For convenience, scales in this line at the Armour plant are of the counter-sunk type. Photo, Exact Weight Scale Co.

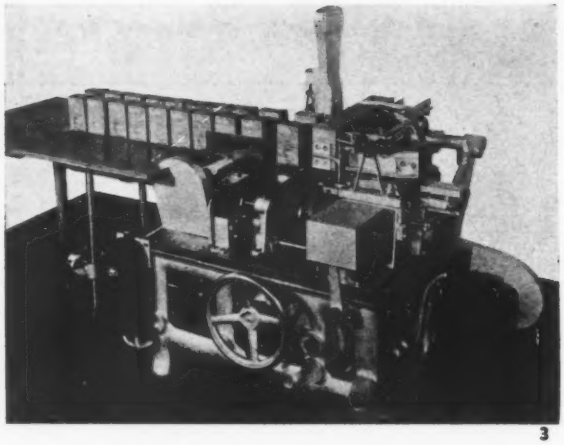
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2—Automatic weighing and filling device for free-flowing granular materials. When exact quantity of material has been discharged into hopper, its flow is stopped automatically and it flows to the chute below the hopper which directs it into the container. Photo, Toledo Scale Co.

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3—Automatic check-weigher rejects over- and underweight units. Such scales are designed for a range of packages. Photo, Arenco Machine Co.



4

4—Dehydrated eggs for Lend-Lease are accurately weighed and packed in 5-oz. units in the Craker Jack plant. Photo, Exact Weight Scale Co.

site end of the scale beam, a pan carries a standard weight container against which each successively produced package is tested. Containers which balance or over-balance continue along the line, while those containers which are of insufficient weight are automatically shoved off.

Another type of sorting scale is used to examine packages prior to filling rather than to weigh the completely filled containers.

With this equipment, articles to be check-weighed are fed to the scale which pushes aside the underweights or the overweights to pass on to the filling machines. Since light packages are separated from heavy containers, it is possible, at a later time, to reset the scale, make compensating adjustments on the filling machines and thus to utilize both.

One company has developed an electronic method of accurately classifying articles by weight during manufacture or packaging. The unit requires no synchronizing with the feeding conveyor, uses neither photo cells nor mercury switches, and operates at unprecedented speed and accuracy. Compact, single unit design facilitates ease of installation.

The operation of this method is unique in that weights are taken at their dynamic value, thus eliminating the mechanics normally required to place the commodity on the scale, release the weighing mechanism and again put the commodity into motion. Packages or articles to be weighed are passed without interruption over the sensitive weighing unit and are automatically diverted into conveyor channels which are arranged to correspond to their weight classification.

The material-labor ratio of many commodities makes it uneconomical to trim after packaging, and in such cases it is usually desirable to reject only the underweight packages. More costly commodities packaged volumetrically warrant hand trimming of overweight packages and usually fall into three classifications: underweight, correct weight and overweight.

5—Over- and underweight scales in this battery are check-weighing a meat preparation before it is shipped overseas. A special formula for the preparation, and the high unit value of the ingredients makes an accurate weight doubly important in this case. Photo, Toledo Scale Co.



5

Volume outage detectors

Perhaps the simplest checking devices—in principle, if not necessarily in construction—are the so-called outage detectors which are used to determine the level of fill of dry product cartons. Various types, straight line and rotary, are available, all of them using the principle of a mechanical finger which is inserted into each package. Should the finger be unable to descend further into the body of the package than a correct fill would permit, a mechanism is set in motion which throws the package off the line. Straight-line detectors are located at the delivery end of high-speed weighing machines and check packages as they leave these units. One type stops the weighing machine automatically if a package passes through which is not filled to the correct height.

Another type utilizes a circular disc, with hanging members set vertically above the packages on the conveyor line. If the material is below the desired height in the container, contact will not be made with the hanging member and a throw-out switch pushes the package off the line.

Bottle cleaning equipment

Of great importance in bottling operations, particularly in the bottling of foods and drugs, is the complete cleanliness of the container. To prevent contamination and to comply with food and health laws, it is therefore necessary to clean bottles before filling, and for this purpose available equipment falls into three general categories: air cleaners, rinsing machines, and machines which soak, rinse and wash the container.

Air cleaners and rinsing machines are recommended only for the thorough cleaning of new glassware which does not require sterilization at the point of filling. These machines will, for example, remove any lint, dust or glass chips which may enter the container between the time of its manufacture and the time when it is used in a packaging plant.

When second-hand or returned bottles are employed, as they are in the milk and beverage industries, only a thorough soaking and washing in sterilizing solutions, followed by a careful drying, can be recommended. Such treatment is an absolute essential.

Air cleaning

In many bottling plants where glass containers come directly from the factory, cleaning by compressed air has been found satisfactory, particularly if the glass has not been exposed—outside of closed shipping containers—to grime or grease.

Both hand-operated and automatic air cleaners are available. With the non-automatic type, the operator places two bottles at a time against air tubes, arranged to provide a blast of air whenever the pressure of the bottle necks is applied. From 60 to 80 lbs. of compressed air pressure is utilized and dirt, lint and grease are thus literally blown out of the bottle. Such machines can be operated at a speed of 30—40 containers per minute, depending mainly upon the size of the container.

Automatic machines of various types are also available. In some instances, rotary machines very similar to bottle-filling machines are utilized, receiving the bottles directly from a conveyor and cleaning them while in upright position. They are discharged, one by one, back onto the conveyor. This latter transfer is accomplished by means of a star wheel.

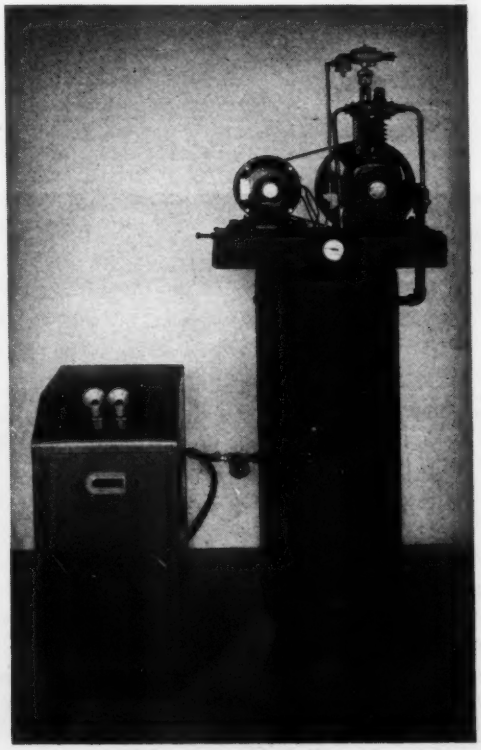
Another type, in a continuous operation, takes bottles, inverts them for cleaning, replaces them, clean, in upright positions and discharges them by means of a star wheel arrangement. *(Continued on next page)*

1—This automatic machine for washing and sterilizing ampuls utilizes a rotary motion. Photo, The Lakso Co. 2—Glassware from the factory may be cleaned by compressed air. This semi-automatic inverted-bottle air cleaner is shown together with its compressor. Photo, Pneumatic Scale Corp., Ltd.

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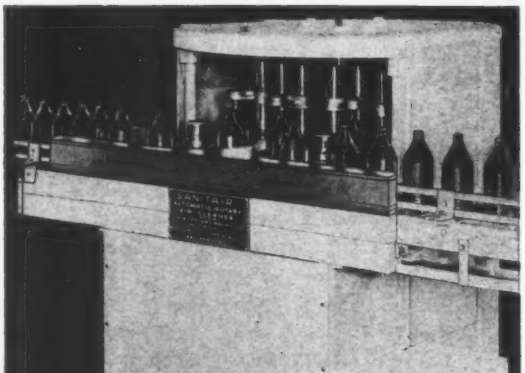


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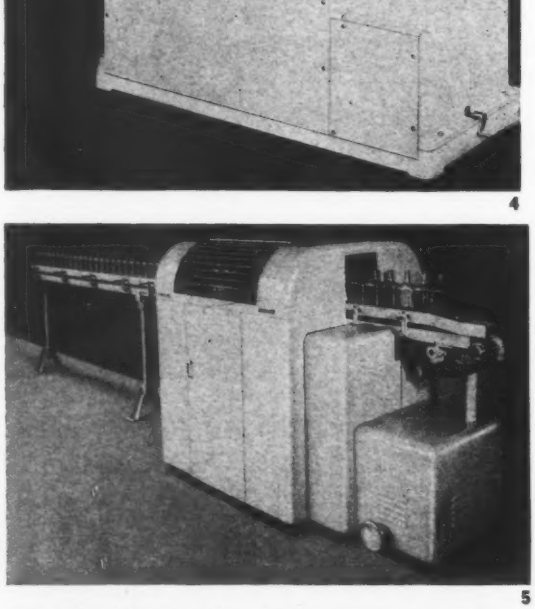




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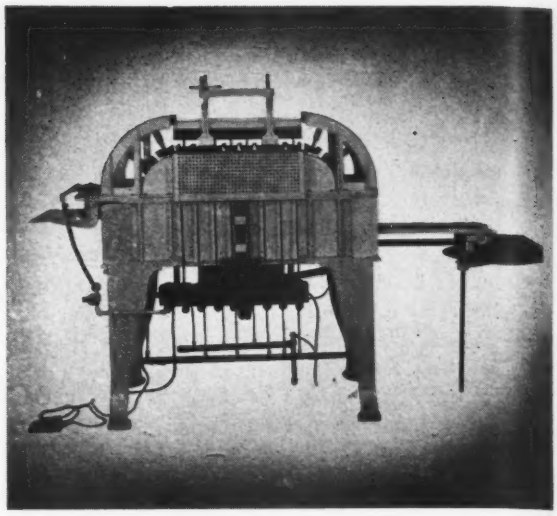


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3—A rotary table for washing of bottles. The bottles are placed on the table and removed by an operator. Photo, F. J. Stokes Machine Co. 4—Automatic air cleaner of the rotary type. Photo, U. S. Bottlers Machinery Co. 5—A straight-line air cleaner which is fully automatic in operation. The bottles are inverted 6 at a time over cleaning heads. Photo, Pneumatic Scale Corp., Ltd.



6

6—Automatic ampul washer feeds, cleanses, discharges ampuls, tubes and similar containers. Ampuls are automatically placed on washing needles and moved through 8 stations. Photo, PerfeKtum Products Co.

Another type of machine receives a group of bottles from the conveyor on to a barrel-like holding device and then proceeds to invert the bottles over air nozzles. Cleaning is thus accomplished while the bottles are held in inverted position. While one set of bottles is being cleaned, the preceding set, at the opposite side of the drum, is being returned to the conveyor and a third set of bottles is being received, immediately thereafter, by the drum.

Air-cleaning equipment is sometimes incorporated as an integral part of a bottle-filling machine.

Bottle rinsers

Bottle rinsers utilize a spray of water—sometimes heated and sometimes including sterilizing solutions to rinse both the inside and the outside of inverted containers. Some of the rotary table type consist of a large number of spouts mounted on a rotary table. The operators invert bottles over these spouts which then pass under a hood where interior and exterior sprays are applied. Machines of essentially similar principle are also manufactured using a straight line conveyor or a chain conveyor, designed to carry one or more rows of bottles through a rinsing hood where both interior and exterior rinsing is performed.

Soaking and washing machines

Soaking and washing machines were designed to meet the far more complicated cleaning problems involved in the use of multi-trip containers. Such containers frequently require the removal of an old stained or torn label. They have often been used—while in the field—to hold products ranging from kerosene to fats. Such machines have had opportunity to collect every sort of contamination—germs, dirt, grease and grime—and thus require the most effective form of thorough cleansing and sterilization which is obtainable.

Machines of this sort usually first rinse the bottle to

7



7—A versatile machine which rinses, washes and dries bottles. The trays permit use for a wide range of sizes. Photo, U. S. Bottlers Machinery Co.

flush out loose dirt, flies, etc., and to preheat the bottles for the high temperature solutions in the following processes. Soaking in hot alkali solutions then follows to remove effectively labels, adhesives and all forms of dirt deposits. Frequently brushing devices for both interior and exterior of bottles are included as an integral part of the machine.

The final operation then consists of rinsing both interior and exterior, to remove all cleaning solutions and then draining and, in some instances, drying is also required.

Variation in machines

Machines vary in size to meet varying production needs. In basic design these machines may be essentially alike and use chain belts equipped to hold anywhere from 1 to 12 or more bottles per link. Feed and discharge may be automatic and directly off a conveyor, or, in some cases, it may be semi-automatic by means of magazine feed or hand feed.

Production speeds, i.e., the number of bottles held per link of chain or belt, vary with the width of the machine, and with the size and type of container. Thus an essentially identical machine designed with a 4-bottle-wide belt will have a capacity up to 32 bottles per minute, whereas an 8-bottle-wide belt machine will have a capacity of 48—64 bottles per minute appropriate for greater production requirements.

Automatic ampul washers

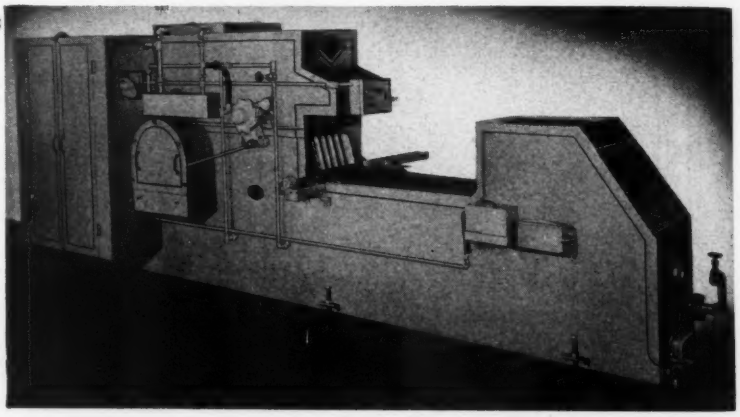
Another development during recent years has been the ampul washer.

Models of this type are available which automatically feed, cleanse and discharge ampuls, tubes and other similar glass containers.

The operator of this recently developed machine places the unclean tubes or ampuls on the loading channels after which they are automatically aligned with the washing needles, placed thereon, and then moved through successive cleansing, washing and drying operations. The ampuls are subjected to the action of a cleansing substance throughout 8 stations and discharged on a conveyor. They are then ready for the autoclave or for the filling and sealing operations.

The operation described above is continuously intermittent, allowing enough dwell period at each station to ensure washing and drying without running the risk of mixing the fluids.

8



8—For returned bottles which are to be re-used, a thorough sterilization is necessary. This automatic bottle washer is wide enough to accommodate 5 bottles at once. Photo, Liquid Carbonic Corp.

Filling liquids and pastes

While a wide variety of equipment, hand-operated, semi-automatic and fully automatic is available for the operation of filling containers with liquids and pastes, such machines fall into two general classifications. One type is the metering machine which delivers the product to the container either by measured volume or by measured weight. The other is the constant level type which fills containers to a uniform height which may be measured either from the bottom of the container to the liquid level at the top or else from the top of the container to the liquid level.

Metering machines

Metering machines are used principally for viscous or semi-liquid products. The constant volume type consists basically of an accurate pump either with piston or with rotary impellers, and is obtainable as hand operated, semi-automatic or fully automatic equipment.

Hand-operated metering units are generally constructed with a piston pump, a hopper in which is loaded a batch of the material to be filled, and a spout to which the operator presents the containers in time with the stroke of the piston. With some products, it is necessary to keep the tip of the spout immersed in the fluid as it is ejected into the container, thus eliminating air pockets. When using hand-operated machines, the operator must remove the container at the proper speed to accomplish this.

Semi-automatic and full-automatic machines of the piston type operate on a similar principle, but they employ two or more piston pumps along with a conveyor which intermittently carries the containers forward. A cam-operated table raises the containers at the filling station and lowers them away in timed relationship with the piston stroke. The containers can be automatically discharged onto a conveyor for all of the subsequent packaging operations.

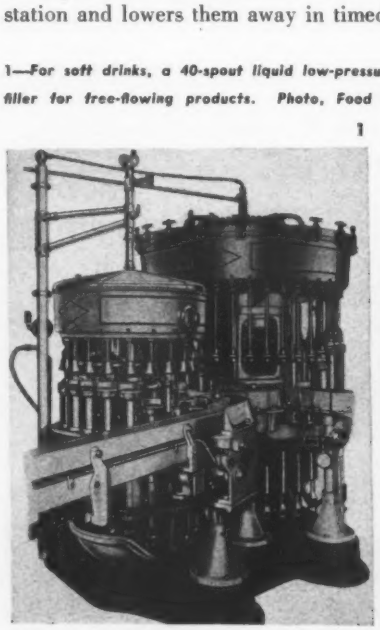
Fully automatic, constant motion rotary machines are also available. This type of equipment can be hand fed by an operator who places empty containers on the trays of the machine. This construction is usually recommended where a wide variety of shapes and sizes must be handled. These machines can also be automatically fed and are well adapted to conveyor line operation where previous and subsequent operations are to be performed. For this purpose, a star wheel is utilized which automatically removes the containers from the conveyor for filling and automatically returns them to the conveyor after the filling is completed.

Rotary machines fall into two general classifications. In one, a series of piston pumps is mounted above the containers and rotates with them so that each piston stroke fills the container below it. In the other type, there is a pump of the rotary-impeller or piston type, depending upon the product to be handled, and a valve head is arranged so that the entire discharge from the pump is ejected into one, and only one, container at a time. In recent years, this type of equipment has been greatly improved so as to give greater speed, cleaner filling and a wide capacity range with minimum change-over time. No jar—no fill and other safety devices have also been added, so as to render the equipment foolproof. The rotary impeller pump has the distinct advantage of a constant velocity of material flowing through it in one direction, so as to minimize its wear and thereby hold its accuracy indefinitely.

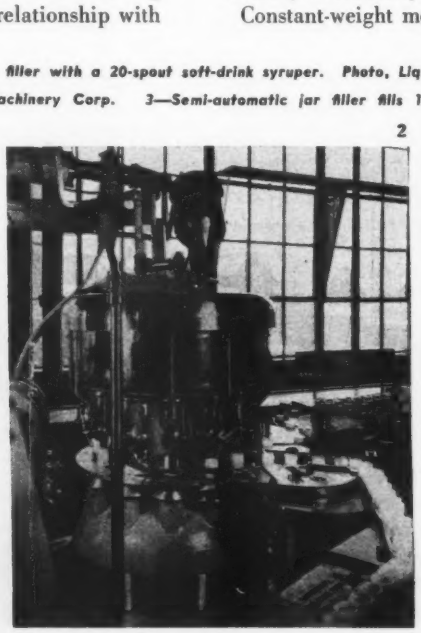
Constant-weight measuring equipment contains a scale

1—For soft drinks, a 40-spout liquid low-pressure filler with a 20-spout soft-drink syruper. Photo, Liquid Carbonic Corp. 2—Predetermined level filler for free-flowing products. Photo, Food Machinery Corp. 3—Semi-automatic jar filler fills 1500 per hour. Photo, Arenco Machine Co.

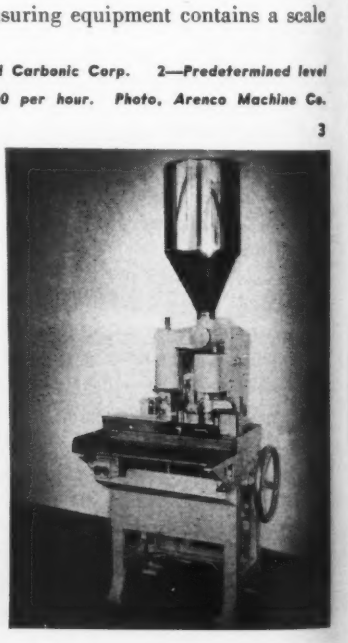
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as an integral part of the machine. As the container is filled to a point where it becomes as heavy as a predetermined weight placed on the other platform, the balancing of the scale causes the filling valve to be tripped and stops the flow. These units are principally of the hand-operated type and generally achieve no greater speed than an operator can obtain with a hose with nozzle-valve, but they offer the distinct advantage of clean and accurate filling.

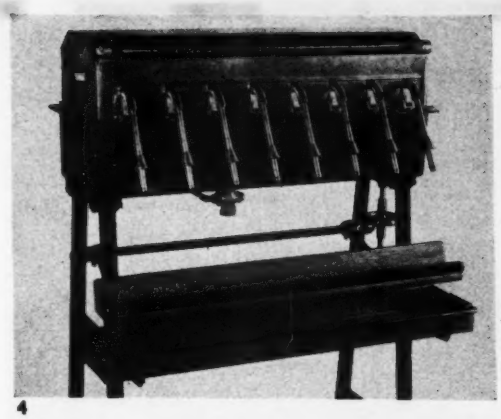
Constant level fillers

Constant level equipment is principally used for light, free-flowing liquids. The siphon filler was the earliest design in this category and is still used for some hand-operated units. In these machines, the container is filled until the liquid level therein is the same as that in the float-controlled supply tank. No overflow problem arises with this method.

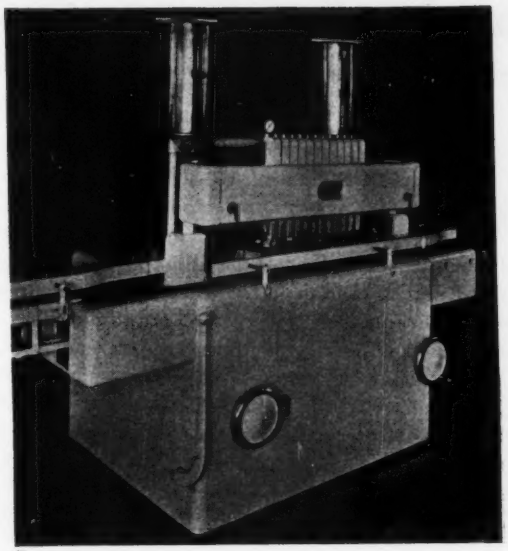
Direct pressure machines require that the neck of the container be sealed, usually with a rubber stopper through which passes the filling stem. This stem contains both liquid and air passages so that, as the product flows through under a gravity head pressure which may vary between 3 and 15 ft., the air is permitted to escape. When the container is filled, the air escapes by the passage provided in the filling tube, the liquid then begins flowing out through that passage, but, since the opening is small, it runs at a greatly reduced speed. This type of equipment is faster than the siphon units and is obtainable in all sizes from hand-operated to full-automatic.

Drip and the filling of defective containers can be prevented by the use of a variant of the direct pressure construction known as the "gravity vacuum." In this design the supply tank, mounted above the filling tubes, is kept under vacuum, so that a vacuum must be created in the

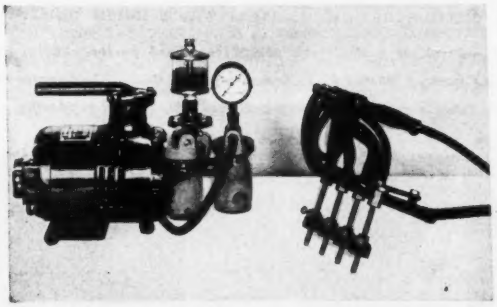
4—Gravity type liquid filler with 8 spouts. Photo, Scientific Filter Co. 5—Automatic vacuum filler for bottles and cans has variable speed drive. Photo, Pneumatic Scale Corp., Ltd. 6—Portable vacuum filler with 4-valve filling heads. Photo, Horix Mfg. Co. 7—This straight line vacuum filler is semi-automatic. Photo, U. S. Bottlers Machinery Co. 8—Automatic feed and discharge rotary machine. Photo Horix Mfg. Co.



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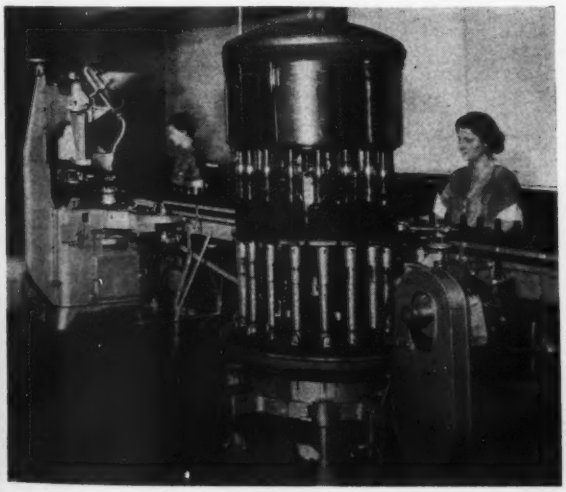


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9—Here a line of vacuum milk fillers for bottling and capping milk is shown in a convenient installation. Photo, Crown Cork & Seal Co.



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10—A filling unit for cheese. In illustration, boxes containing bags are filled with hot cheese from pasteurizer. Photo, Frank D. Palmer, Inc.

container before the liquid can flow into it by gravity.

In full-automatic equipment, the straight vacuum, the gravity-vacuum and gravity principles are frequently used. In the vacuum construction, the float-controlled supply tank is mounted below the filling tubes. The containers are sealed, as in the direct pressure units, and the air withdrawn from them. The reduced pressure thus produced causes the liquid to be drawn into the containers, the overflow going out through the air tubes just as it does in the pressure machines. The liquid is separated from the air by an automatic trap, the fluid being returned to the supply tank and the air going out through the vacuum pump.

Recent improvement in filling equipment

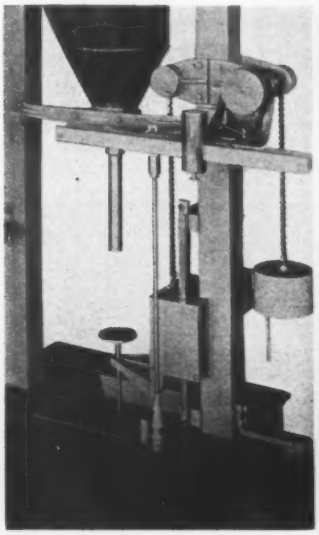
Machines have been developed with devices guaranteeing protection against damages which might otherwise result from carelessness on the part of the operator or from choke-neck or misshapen containers, or even from the stopping of other machines in the line.

Operating speeds of automatic filling machines have been substantially speeded up to as many as 300 14-oz. bottles per minute. Of course, speed—while of great importance—is but one of a number of considerations by which a filler should be judged. Among other important factors are ease of adjustability and ease of cleaning. Machines for foods and chemicals are often made with stainless steels or other reaction-resisting materials on all parts coming into contact with the material which is being filled.

Semi-automatic units are generally of the straight-line type through which the containers are advanced intermittently. Full-automatic equipment of both the straight-line and the rotary type is obtainable.

11—Detail of a single-unit packer for filling pastes. Photo, Stokes & Smith Co. 12—General purpose filler employed for thick liquids and pastes. Photo, F. J. Stokes Machine Co. 13—Syruper-filler-crowner for bottling soft drinks is a rotary machine with 6 syrupers, 40 filling valves, 6 crowning cylinders. Its normal production capacity is 128 6-oz. bottles per minute. Photo, Crown Cork & Seal Co.

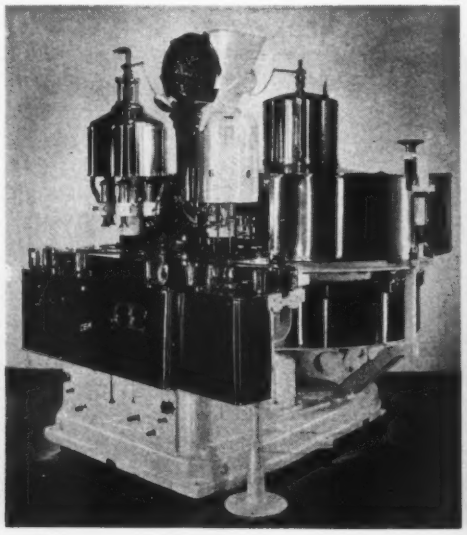
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Capping and sealing equipment

Various types of equipment are necessary for applying screw caps, crowns, corks and vacuum caps to containers at the varying speeds which different operating conditions demand, and appropriate units have been devised to meet practically all needs.

Today, capping and sealing machines range from the simplest hand cappers to high-speed fully automatic equipment, operating on conveyor lines in conjunction with filling and labeling and cartoning machines. Some of these machines are discussed below.

Screw and turn-on caps

The application of screw-cap closures is not as difficult a problem as it at first appears. When the cap is properly designed so that the lead threads readily follow the thread on the glass, thus preventing any tendency to cross thread, and the liners are glued into the cap or attached in a satisfactory manner so as to prevent their falling out of the cap, it is possible to employ automatic equipment in the application of these closures for a satisfactory sealing.

There are several types of machines available for applying turn-on caps. On some of these it is only necessary to dump the caps into a hopper, from where they are systematically sorted and fed to the machine in relative coordination with the containers which are received from the filler.

On others, generally referred to as semi-automatic cappers, it is necessary to start the cap on the container. Regardless of the type machine employed, the cap must be applied with the proper tension so that a perfect seal is achieved not only with the top of the bottle but also with the cap liner.

Hand-capping machines

Machines made for hand capping are, in many cases, used where production requirements are so small that the tendency is to continue with the old hand operation. For those manufacturers whose requirements are small, the adoption of at least a hand-tightening unit is recommended. This unit can be adjusted so that every cap will be applied to the proper tension in order to ensure a proper seal and still it will be easily removable by hand as required.

Semi-automatic machines

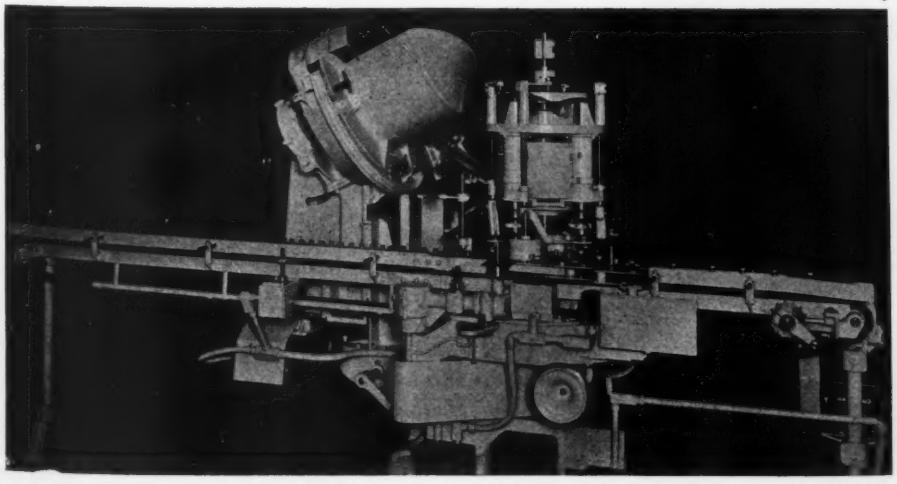
Machines which are semi-automatic are of the same general construction and size as the fully automatic. The cap-feeding device, however, is omitted and the cap started on the container by hand. It is installed in the the production line as is the fully automatic machine, occupying the same amount of space. It has a feed conveyor and a discharge conveyor and the containers are both fed and discharged automatically.

The smallest semi-automatic machine is generally a single-head machine designed for operating at capacities of 1800—2700 units per hour. In order to obtain a larger capacity, it is necessary to employ a machine using a number of spindles rather than a single head. These units are designed to possess a capacity of from approximately 50 containers per minute to 120 or more. They are usually of the rotary type and are in practically all cases the same machine as the fully automatic, except for the omission of the automatic cap-feeding and applying mechanism incorporated in the fully automatic machines.

Another variation of the semi-automatic capper is the type which uses a belt cap-feed onto which the operator

1—For volume, output, fully automatic machines often offer greater efficiency which reduces the production costs. This 4-head fully automatic capper is of the rotary type. Photo, Pneumatic Scale Corp., Ltd. 2—A semi-automatic screw capper, single head variety. Photo, Scientific Filter Co.

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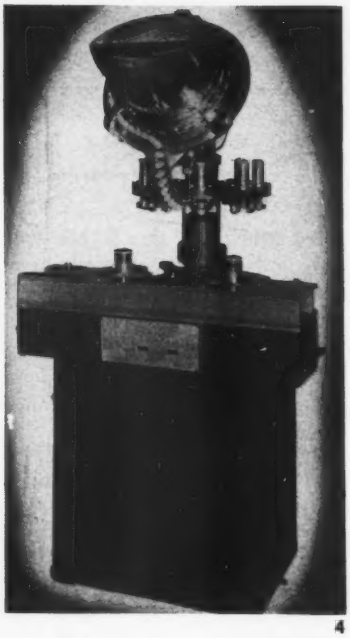


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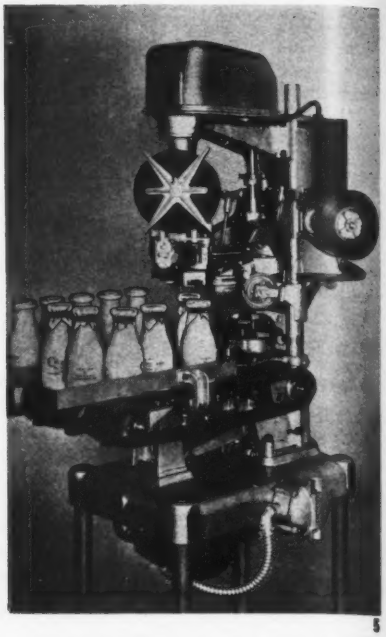




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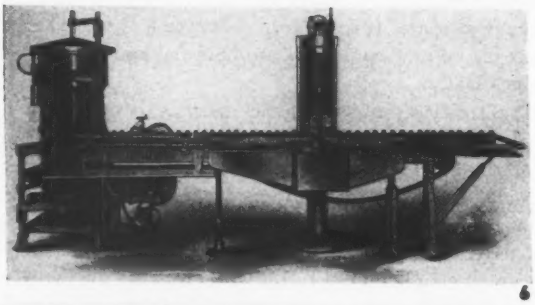


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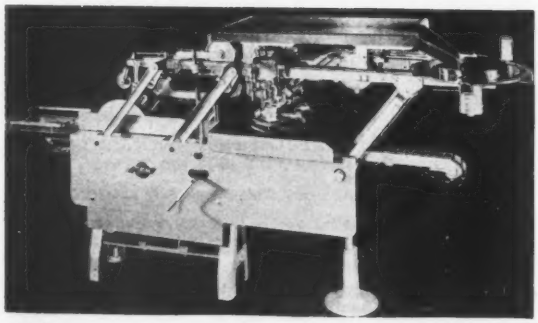


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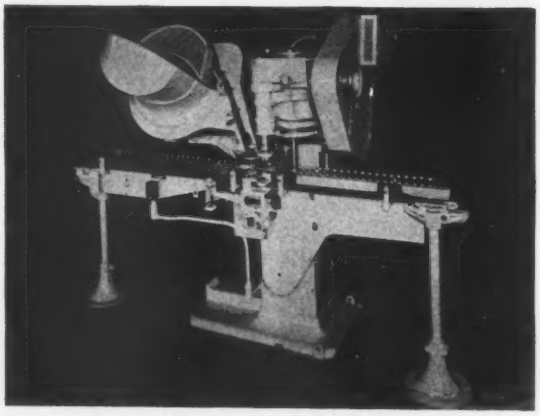
3—Ten-head rotary crowner for carbonated beverages. Photo, Liquid Carbonic Corp. 4—Full-automatic rotary corker for flanged corks. Photo, U. S. Bottlers Machinery Co. 5—Milk-bottle hooding machine forms, applies, heat seals protective caps. Photo, Package Machinery Co. 6—A semi-automatic screw capper with rotary bottle filler is hand-fed, discharges automatically. Photo, Horix Mfg. Co. 7—Vacuum pry-off cap sealer for jars. Photo, Crown Cork & Seal Co. 8—A single-head, fully automatic capper. Photo, Pneumatic Scale Corp., Ltd.



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simply feeds the caps. From that point on, operation is completely automatic. This method is often used where closures are of a type not suited to automatic sorting and automatic feeding.

The semi-automatic unit can be readily changed from one size container and cap to another and the cost of attachments for the different containers is not exceedingly high. On the fully automatic machine, a change from one size cap and container to another requires a longer period of time and the attachments, of course, are definitely much more costly.

Fully automatic machines

In regard to larger capacities, or outputs, machines which are fully automatic are sometimes found to be far more desirable inasmuch as their greater efficiency will considerably reduce the packaging production costs. Automatic units are most profitably adapted to those production lines operating at a capacity of 45 or more containers per minute. There are, however, many instances where a steady production of 35 to 40 containers per minute is needed and sizes are suited to automatic production. In such cases, a full-automatic, single-head or slow-speed, multiple-head unit may be desirable.

A recent development replaces the familiar hopper with a worm feed device. Since this eliminates the necessity of agitating and jumbling large masses of caps in a hopper, it permits the handling of delicate types which could not previously be handled automatically and par-

ticularly it is suitable for those closure types where the height exceeds the diameter.

Crowns and corks

If plain or flanged corks are used, the capping problem resolves itself into one of inserting the cork into the neck, rather than turning a thread. Such insertion is, in the vast majority of cases, accomplished in part or in whole by hand. The most familiar mechanical aid is the corking wheel conveyor, which consists of a section of belt conveyor with a wheel of fairly large diameter suspended above it at the height of the bottle top. Operators start the corks as the containers pass down the forepart of the conveyor and the movement of the belt then forces the bottles, under the corking wheel.

Another type of corker substitutes an endless belt, running over two pulleys, for the corking wheel. A rigid metal plate behind the slanting lower portion of the moving belt forces the corks firmly and evenly into the neck of the containers.

Crown caps are frequently applied by equipment forming an integral part of bottle-filling machines. However, separate rotary crowners of fully automatic type are available. These are very similar, in feed and general structure, to rotary turn-on closure cappers, except that they substitute a crown-forming pressure for the turning action of the ordinary capper.

Hand and semi-automatic devices for applying crown caps, milk bottle caps, foil and paper hoods for milk bottles and many other specialized types of closure or super closure are also available. The basic principle of application varies very little, however, from those described in the foregoing discussion.

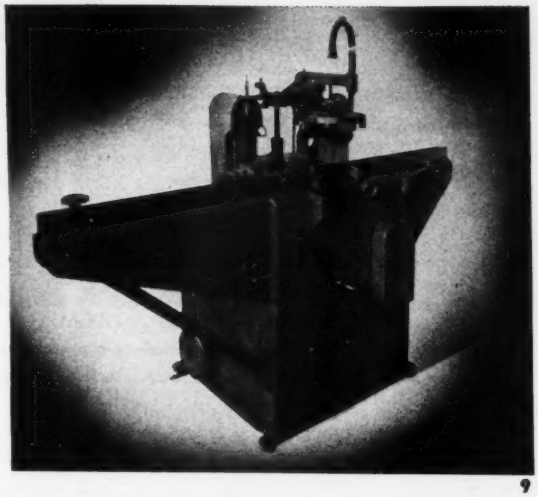
So-called roll-on caps are applied by rotary automatic machines which position the unthreaded cap on the bottle and hold it thus while revolving rollers form the cap metal to the shape of the bottle thread.

Fully automatic corking units have been devised recently for a number of special applications. In one such machine, corks are placed in the correct position in the corking head for driving into the bottle neck by a positive air-pressure-feeding device. Corks are hopper-fed into a channel that directs each cork to the correct position and register before insertion in the bottle neck. The large-capacity hopper is so designed that a casual glance from the line operator will determine just when a new batch of corks is required.

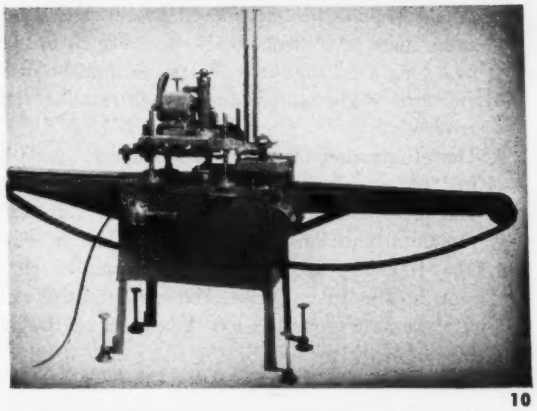
Feeding of the filled but uncorked bottles into the machine is controlled by an electric feed switch. The machine is so designed as to stop automatically whenever a "break" appears in the line of advancing bottles and to remain stopped until the break is closed. The machine is equipped with a variable drive, making possible its operation at exactly the speed called for by the production schedule and its synchronization with the other units of a packaging line.

Vacuum sealing

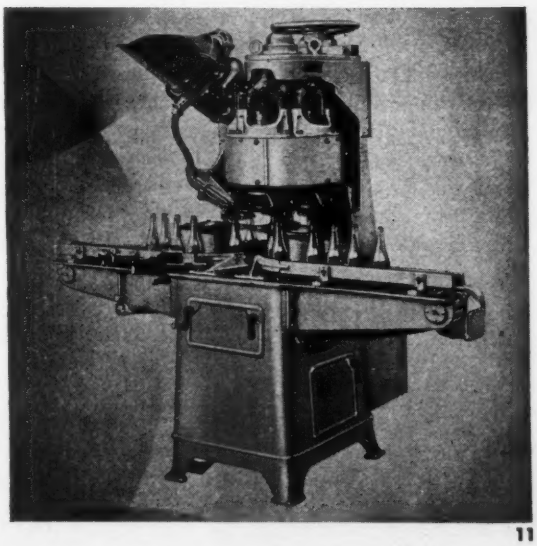
In general, the result of the use of vacuum is that action of oxygen as a destructive agent is retarded to a negligible point. *(Continued on next page)*



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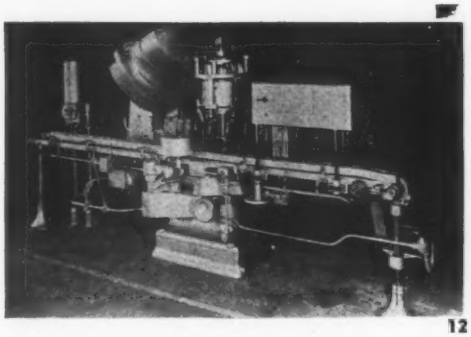


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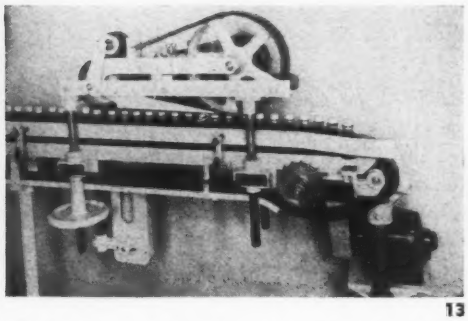


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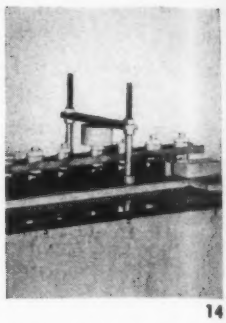
9—This automatic cottoner is for the inserting of wadding into pill bottles. Photo, Lakso Co. 10—A fully automatic straight-line vacuum capping machine which is actuated by steam. It employs dry, live steam and is able to vacuum-seal up to 100 jars or bottles per minute. Photo, Anchor Hocking Glass Corp. 11—This machine seals up to 300 bottles per minute. It is designed to synchronize with the filler, and can adjust up to gallon size. Photo, Aluminum Co. of America.



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12—Machine which applies screw caps or depresses corks. Photo, Pneumatic Scale Corp., Ltd. 13—A cork-depressing device which is operated on the conveyor line. Photo, Pneumatic Scale Corp., Ltd. 14—Detail of cap-pressing device on a full-automatic filler. Photo, Stokes & Smith Co.

These advantages of vacuum sealing may be summed up as follows:

1. The prevention of rancidity of oils and fats contained in food products. Even though this deterioration may take effect slowly, it is difficult to forsee how long a package may remain on a dealer's shelf and even slight rancidity is enough to affect flavor adversely.
2. The elimination of discoloration due to oxidation. No "off color" product is appetizing or salable.
3. The preservation of delicate flavors and aromas—particularly true where a mechanical vacuum is used.
4. The retarding and practical elimination of the growth of mold and yeast. The rapid multiplication of these micro-organisms is dependent on the presence of air.
5. The effective reduction of the corrosive action of acids and other chemical properties of food products. Corrosion is a process of oxidation and hence is stopped through the use of a vacuum.

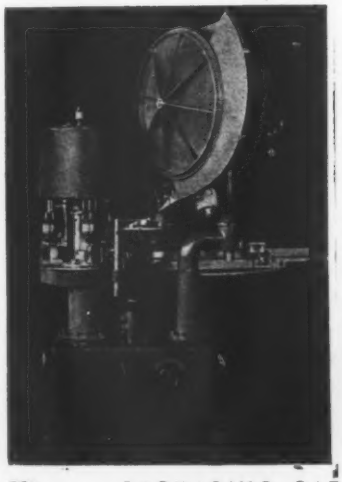
In general, there are two types of sealing machines for the application of metal caps under vacuum—mechanical and steam. In the mechanical type, there are two styles. One effects a vacuum seal by means of a vacuum pump and the other creates a vacuum by means of a piston arrangement built in the machine itself.

Mechanical vacuum types of sealing machines are available in a variety of styles, ranging from the simple, hand-fed types to the completely automatic styles. These machines are designed to apply caps, under vacuum, to jars, tumblers and bottles.

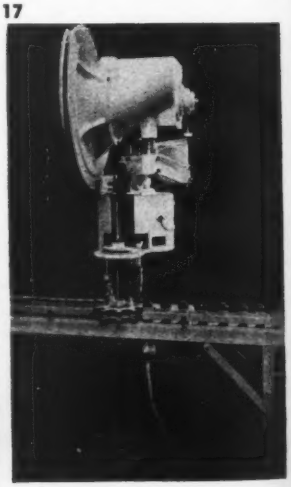
The development of vacuum by the displacement of air with steam provides a unique and highly important characteristic in that the vacuum is formed after the closure has been applied, thus preventing the sucking out of a cold packed product from the container or the boiling over of a hot packed product. Mechanically, the steam-vacuum system is simple. No vacuum pumps are used. All that is required successfully to operate the system and the capping machine is a steam supply and an available electrical current.

While the primary purpose of the steam is to displace the air from the head space, it also serves a secondary function in that it sterilizes the cap and creates a sterile atmosphere for the capping operation. In general, the speed of the machine may be adjusted to the convenience of the packer and the machine can be set into packing conveyor lines. Most varieties are readily adjustable for differing sizes and styles of jars or tumblers and for varying sizes of closures. Regulation of the degree of vacuum—with the steam types—can be governed by the amount and temperature of the steam atmosphere. With the mechanical types, such regulation is effected by adjustments of the pump controls.

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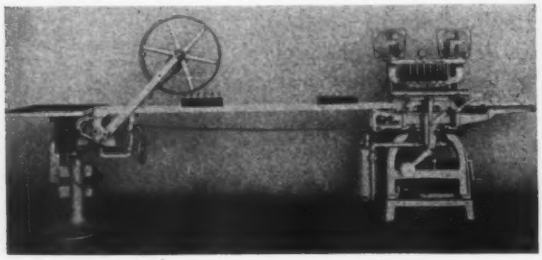


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15—Full-automatic, 4-spindle rotary capper. Photo, Consolidated Packaging Machinery Corp. 16—Corking wheel unit on discharge conveyor of filling machine. Photo, Pneumatic Scale Corp., Ltd. 17—Full-automatic capper sorts, feeds, applies cover assembly to cans. Photo, Consolidated Packaging Machinery Corp.

16



Labeling machines and devices

Modern labeling machines are basically designed for the following types of labeling methods:

1. *Adhesive is applied to "pickers"* which in turn carry the label from the bottom of a hopper to the package. The label is clamped to the package by grip fingers; the pickers detach themselves from the label and then pressure is applied either by flexible wipers or by press wipers so that the adhesive which remains on the label from the pickers causes the label to be attached to the wall of the package.

2. *Adhesive is applied to a rubber pad.* This pad is brought in contact with the package and then the label in turn is brought in contact with the adhesive-covered surface of the package, after which pressure is applied by wipers to form the union.

3. *The label is fed by pneumatic means* from a hopper, passed over an opening where a spraying apparatus applies the adhesive. By the same pneumatic means, the label is then carried to the package and applied. Pressure is exerted to complete the attaching.

4. *The label is fed from a hopper by means of a pneumatic platen* which rigidly holds the label over its entire surface in a flat condition and carried tangentially over a twin roller gumming mechanism where a uniform film of adhesive is rolled onto the label. By the same pneumatic means, it is carried and attached to the article, after which pressure is applied to ensure firm adhesion. The modern labeler is offered in both semi-automatic and fully automatic models. Methods 1 and 4 are employed for semi-automatic or hand-fed machines; all four methods in the automatic labelers.

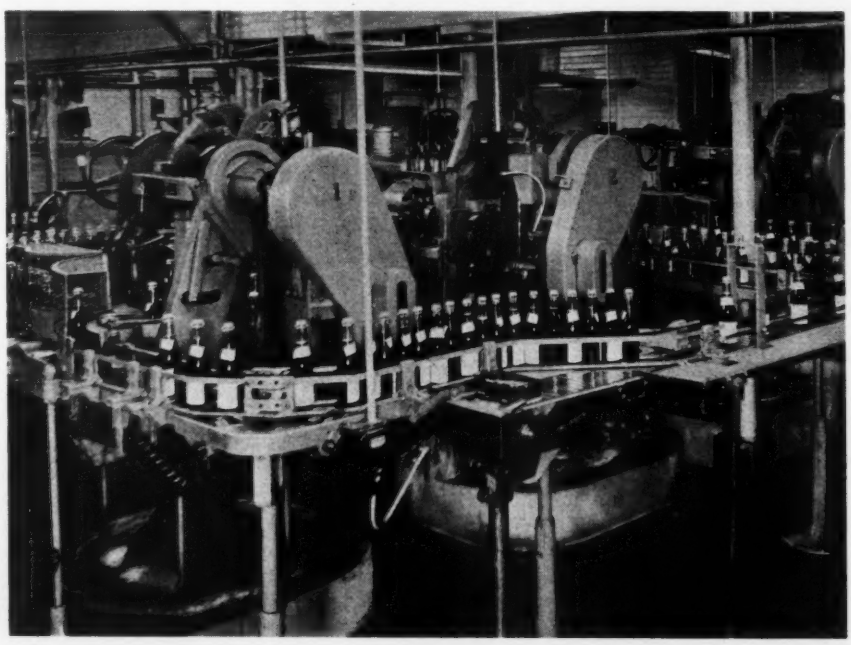
The semi-automatic or hand-fed labelers on the market today are capable of offering the user capacities from 30 to 60 labels per minute. The production, however, must of necessity depend on the article itself, on the dexterity and application of the operator and the plant management in bringing the articles to and from the machine. Inspection and packing should be done immediately after the operator removes the labeled article from the machine and, in the choice of the labeler, this feature should be strongly considered so as to eliminate unnecessary and costly handling charges. Some labeling machines have an extremely wide range of adjustability.

There are semi-automatics on the market capable of applying more than one label onto the package at one time and applying the foil onto the neck of the bottle, as used in the soft drink industry. These are capable of handling fragile articles which the larger and faster fully automatic machines could not.

The labeling of paper boxes with paper or paper-backed foil labels or heavily embossed metallic seals, the manufacture of greeting cards, calendars, photomounts, the labeling of cigar boxes, wooden articles, attaching of paper handles to drinking cups, certain types of transparent material to folding box windows, etc., can be accomplished by some of these semi-automatic models.

Automatic labelers can be segregated into three divisions as follows:

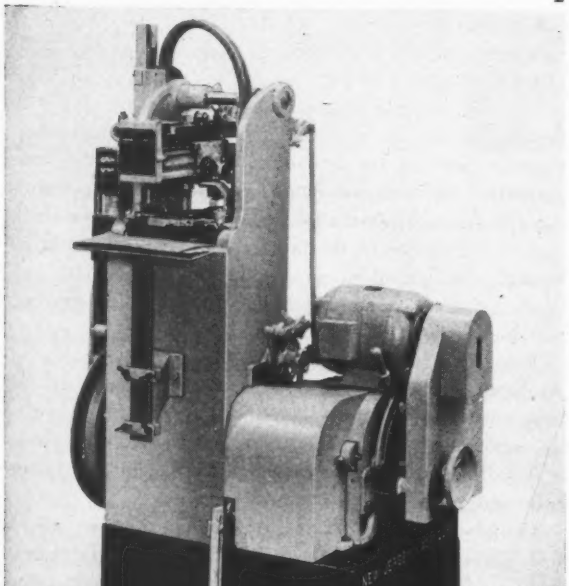
1. *The rotary type* of fully automatic labeler employs method No. 1 and method No. 4 for the application of the label and, as mentioned under the semi-automatic machines, it is also capable of applying two or more labels



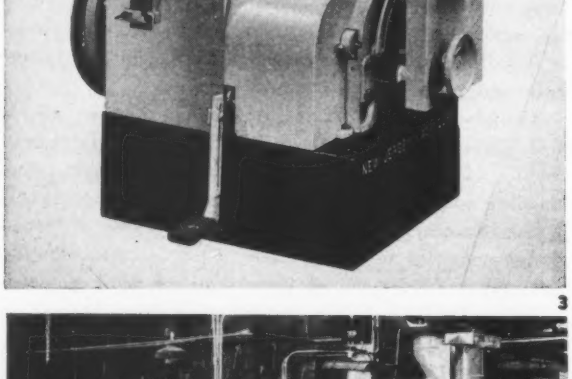
1—An installation view of a line of automatic rotary labeling machines at a bottling plant shows one of many possible arrangements. These machines handle round bottles of various sizes. Photo, Economic Machinery Company.

2—*For applying heat-sealing labels which have been treated with thermoplastics, this machine can be adjusted to a variety of packages. Photo, New Jersey Machine Corp.* 3—*Versatile straight-line labeler for bottles. Photo, Economic Machinery Co.* 4—*Turret labeler applies body and neck labels and foil. Photo, Economic Machinery Company.*

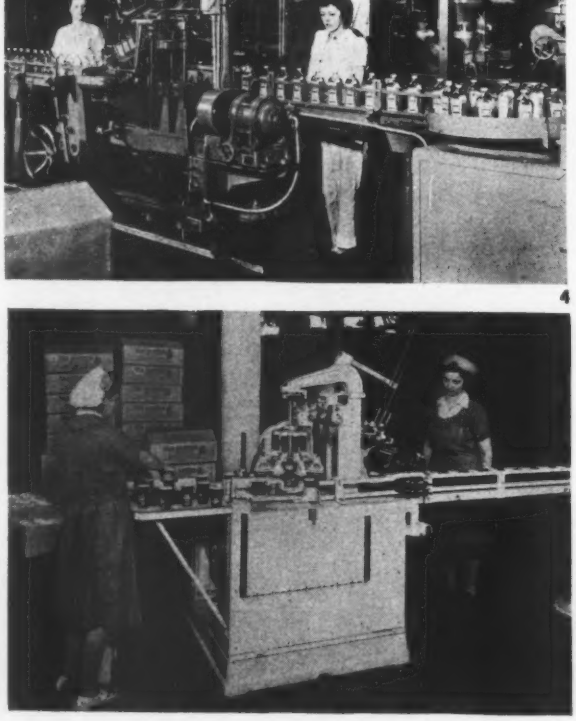
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simultaneously, together with the foil neckband if desired. Consequently, it is particularly adaptable wherever round bottles, irrespective of their size, are used.

The bottles are taken from a conveyor by means of a star wheel or similar mechanism and timed through the machine. They are automatically ejected onto a conveyor and led away from the equipment to be inspected, packed or stored. Speed range is 60—200 per minute.

2. *The straight-line type*, being of more recent design, can be used more universally as its construction allows a wider latitude in the shape of the containers and greater accuracy in the "spotting" of the label. All four methods described above are used in the feeding and attaching of the labels. Further, their design allows the adhering of front and back labels simultaneously and, by duplexing (i.e., labeling two articles at a time), higher speeds are obtained than with the rotary type. Productive capacities of 120 per minute are obtainable.

3. *The straight-line multiple type*, as its name implies, labels a group of containers simultaneously. The production or capacity is determined by the size of the group of containers labeled simultaneously, multiplied by the machine speed in cycles per minute.

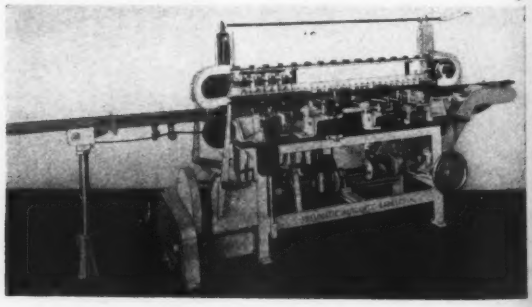
Available machines of the straight-line multiple type use the "picker" method for transferring and applying body, or body and neck labels to groups of 4, 6, 8 or 10 containers simultaneously for respective capacities of 80, 120, 160 or 200 per minute; or body and foil, or body and neck and foil to groups of 4, 6 or 8 containers simultaneously for capacities of 80, 120 or 160 per minute.

In choosing the type of labeler, certain essential points should be borne in mind:

1. The type of label material to be handled—whether plain paper, varnished or lacquered, or foil labels or metallic seals
2. Whether the label is rectangular or odd shaped
3. The type of bottle, jar or package to be labeled
4. Range
5. Ease of changing from one size to another
6. Cost of change parts and their simplicity
7. Control of the adhesive application
8. The cleanliness of the labeling job
9. The accuracy of the labeling job
10. Accessibility of the machine in the plant
11. Productive capacity that will be required

5—*Duplex labeling machine which is used to apply labels to the front and back of jars. Photo, Pneumatic Scale Corp., Ltd.*

5



The labeling of round cans presents a different problem since the label as used on this package is of the "wrap around" type, the extremities lapping over each other. For this purpose, round-can labelers have been designed, both of the semi- or hand-fed and fully automatic types.

There is a distinct difference in these two types in that the former covers the label with adhesive over its entire surface, the latter applying adhesive partly to the can body and only to the glue lap of the label.

In the semi-automatic machine, the can as well as the label are introduced manually and the finished article ejected by hand as well. From 4000 to 6000 cans can be labeled per eight-hour day, the variance depending upon the size of the package, the facility of bringing the work to and from the machine and upon the dexterity of the operator. These machines have fairly large ranges and require no change parts, the range being self-contained.

In the fully automatic round-can labelers, the cans roll down a track and have "spots" of adhesive applied. These "spots," when the can passes over the label hopper, pick up the label which is then wrapped around the can, the label having a glue strip applied to the lap. This glue strip forms the closing joint. In preparing labels for these machines, to get the best results the grain should run parallel to the longest dimension.

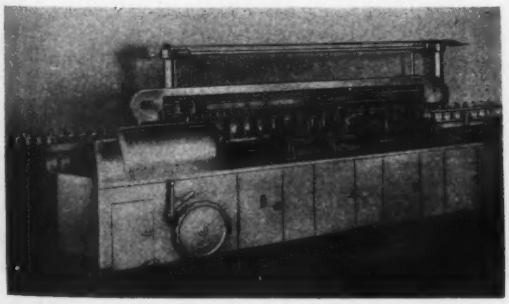
Machines and appliances are available by means of which "heat-seal" labels are applied. This comparatively recent development in labeling (see p. 304) makes use of thermoplastic adhesives in such a manner that labels may be securely affixed to such soft surfaces as wrapped breads and cakes. In some cases the labels, individually cut, are fed from a stack in the manner now familiar. Other machines provide for the roll-type of feed.

Label gummers are not truly labeling machines, for they are not used actually to apply the label to its point of final contact with the package. Their function is, rather, to apply a gummed coating to an uncoated label or to moisten a pregummed label and thus to facilitate hand application. A number of types are available.

A number of devices have recently been developed for applying code numbers or other serial identifications to labels. These are usually punch-type machines designed for use near or adjacent to the labeler. They operate at speeds of as high as 250 labels per minute and are available in types that print or perforate. Changeover of code symbol is accomplished with little loss of time.

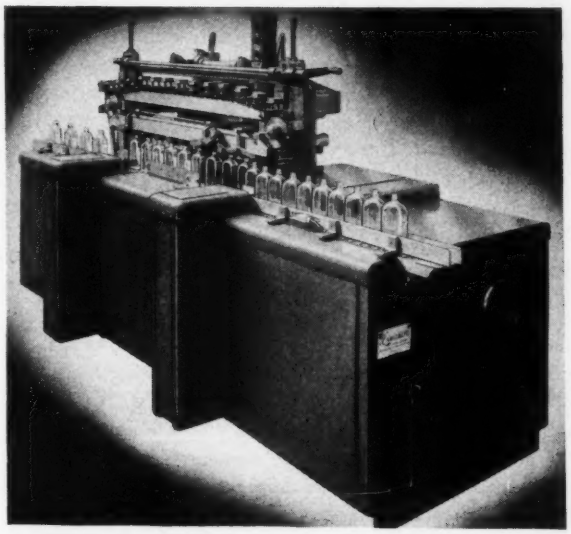
6—Duplex labeler with automatic spotting device rotates bottles and applies labels in fixed spot. Photo, Pneumatic Scale Corp., Ltd.

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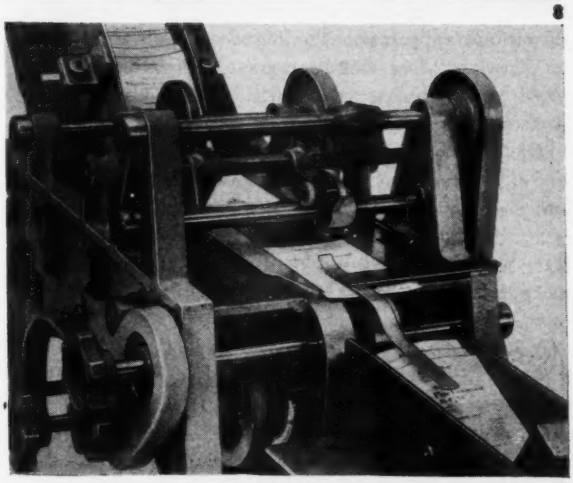


7—A fully automatic unit which applies face labels to bottles at 70 per minute. Photo, New Jersey Machine Corp. 8—Portable machine imprints code numbers on labels. Photo, New Jersey Machine Corp. 9—Roll-labeling mechanism on a wrapping machine automatically applies thermoplastic labels during wrapping. Photo, Oliver Machinery Co.

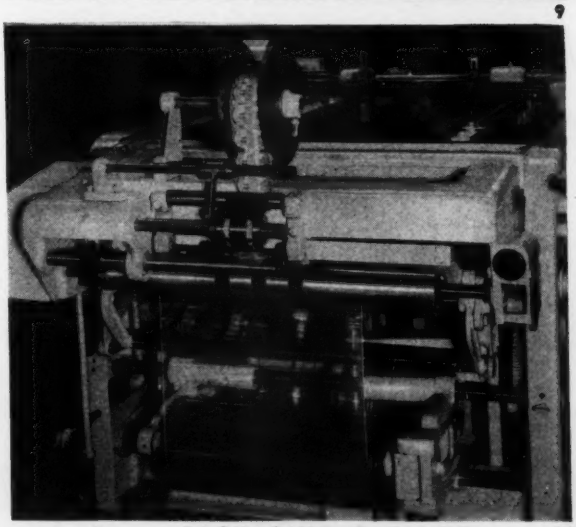
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Wrapping equipment

Techniques for wrapping packages by machine fall into two general classifications—removable or loose wrapping and wet or tight wrapping. Despite the increasing popularity of the latter method for certain types of products, the practicability of removable wrapping is generally recognized, and it serves many important purposes in present-day packaging. In this article, the discussion will be confined to methods and equipment for loose wrapping. (For tight wrapping machines, see p. 660.)

Wrapping boxes and rectangular objects

Prior to restrictive orders, manufacturers were much inclined to increase the use of attractive overwraps of cellophane. By wartime restrictions (L-20), however, overwraps of many materials were forbidden. Crackers, tobacco, cigarettes, chewing gums, etc., are examples of the goods which might require such protection.

When private brands for different customers are to be handled, plain cartons may be wrapped in printed materials or in unprinted wrappers and labels, for identification and appearance. The loose wrappers can be held in place on the cartons by means of thin glue lines, applied automatically, which will prevent the wrappers from slipping from the cartons after opening them.

The loose wrap lends itself especially well to the placing of a circular or premium between the box or carton and the outer wrapper and where a revenue or tax stamp is necessary, as in the case of cigarettes. Provisions have been made on many automatic wrapping machines to make the feeding of the circular from a magazine a part of the wrapping operation.

A great advantage of the loose wrap is, of course, that it can be used without an inner protective covering. Individual pieces of candy are cut and sized on the same machine and then wrapped in transparent cellulose or waxed paper with the ends folded or twisted. Irregular pieces of chocolate candy are wrapped in foil. Candy bars of many different types are wrapped in cellulose or waxed paper and application of the electric eye makes possible the use of printed wrappers in roll form. Candy pops may be wrapped in waxed paper or heat-sealing cellulose on automatic machines. Bread and cakes, too, lend themselves to loose overwrap, as do cigars and other articles.

For the automatic wrapping of frozen foods, the loose wrap is necessary. Wrappers which can be heat sealed and withstand the low temperature conditions necessary in the packaging and preserving of frozen foods are waxed paper or heat-sealing cellulose. Both of these materials are, of course, obtainable in printed roll form and the electric eye can be used to register the printed panels.

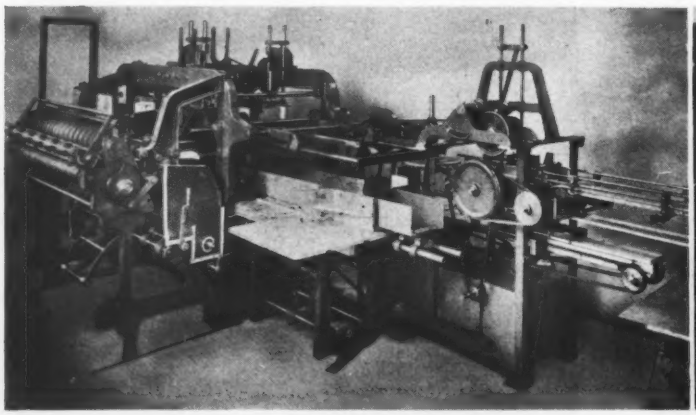
Other uses have also been found for carton and box wrapping machines. Automatic bundling of cartoned merchandise is a comparatively new development and is very popular with the manufacturer who is confronted with the problem of distributing his goods economically. The cost of paper wrappers is considerably less than that of pasteboard containers and the fact that paper weighs less than pasteboard will materially reduce shipping costs.

One new development, of particular interest because if meets certain package specifications for military and Lend-Lease purposes, is a double-wrapping machine which produces a securely sealed "package within a package" at the rate of 60—70 per minute.

In this method it will be found that the double package is made up of a cut and scored carton blank and an inner liner of wax, parchment, glassine or a laminated film. The inner liner is fed from a roll, and is cut, formed, folded and sealed around rigid forming blocks, following which the carton blanks are folded around the blocks, then side- and bottom-sealed.

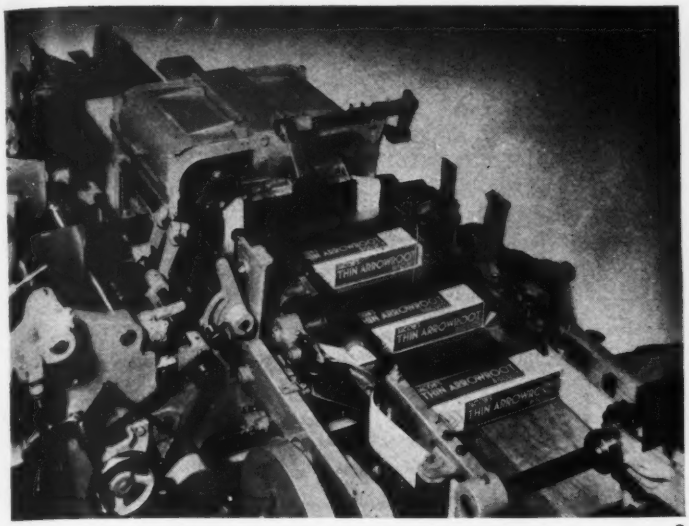
1—Bundler for cracker cartons may be adjusted to different sizes and assemblies, bundles cartons in kraft paper, applies end seals. Assembler is shown at right. 2—Close-up of end sealer. Gummed seals are automatically moistened and are then cut off. Photos, Package Machinery Co.

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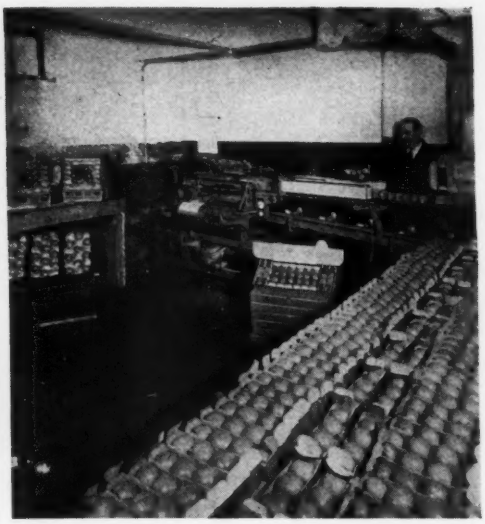


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3—A close-up view of the folding, slitting and gluing mechanism of a sheet-fed machine which makes slit-end folds. Photo, Battle Creek Bread Wrapping Machine Co. 4—Installation of equipment for wrapping cartons of tomatoes in cellophane wrappers. Photo, Hayssen Manufacturing Co.

Specialized wrappers

The recent development of many new machines of a very highly specialized nature includes a group such as machines for wrapping cakes of soap, bars and pieces of candy, cigars, packages of cigarettes, yeast cakes, fruit drops and mints and many similar articles and packages. All of the popular types of wrapping materials can be handled by these machines, and here again, electric-eye registration has been important. The wrapping operation on these machines has also been improved to decrease the amount of wrapping material needed. Especially is this true in the confectionery trade, in the wrapping of candy pops, where the use of a tight twist, heat-sealed wrapper has decreased by about 20 per cent the amount of wrapping material needed.

For candy, machines are available to take the candy in plastic form, form it, cut it and wrap it, either with folds or with twisted ends and speeds can be attained up to 500—600 per minute. With twisted wrapping, the machine can be arranged so that the twisted ears can be colored and colored inserts can be put inside the wrapper. Old standbys, such as kisses or caramels, can be dressed up now in a highly attractive and salable form.

Wrapping baked goods

Wrapping in the bakery field has assumed proportions of a highly specialized science. As in many other fields, there are several forms of producer-distributor organizations. The products, too, are varied. In some cases a fresh output is baked daily, while some products must be wrapped for a store life of weeks.

The development of automatic packaging machinery has without a doubt been a contributing factor, firstly in the growth of large bakery organizations with a wide distribution and, secondly in supplying better, fresher and more sanitary products to the consumer at lower cost. The large wholesale baker is likely to have a fully developed line of packages, printed or lithographed for identity and sales appeal, and is very much concerned with savings of packaging material which are possible when using modern wrapping machinery.

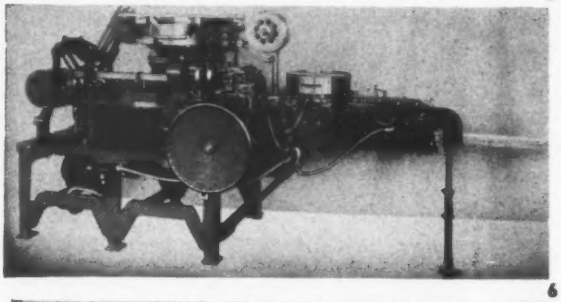
Several manufacturers specialize in wrapping machinery for the baking industry, making "high-speed, single-purpose" models on the one hand and semi-automatic specialty wrappers on the other. "High speed" in the field of cake wrapping is perhaps 50 units per minute. Some of these machines make use of an automatic card feeder, this being a necessity and practically a basic part of the machine. The cards are usually of stiff, odorless, unwaxed board 0.020—0.025 in. thick and rectangular in shape. They are fed into the machine automatically, thus leaving the operator's two hands free to place the cake on the intermittent chain as it passes her station. The usual fold on these machines is the so-called single point "underfold" wherein the ends are brought neatly beneath and sealed against the supporting card. This type of machine is used principally for heavy production of "nickel cakes." Many varieties can be handled but the overall size of the card must be within the original limit of the machine.

A recent development is the automatic feeding, placement and gluing of labels of any acceptable size or shape. Labels are fed from a magazine by the use of a vacuum, pass through a gluing mechanism and are pressed to the wrapping material just before it passes between the paper-feed rollers. This places the label in proper position on the package. Another device is one which applies a continuous printed band to the wrapper, the band being placed either on the inside or outside, running lengthwise. Bands may be of wax paper or heat-sealing cellulose.

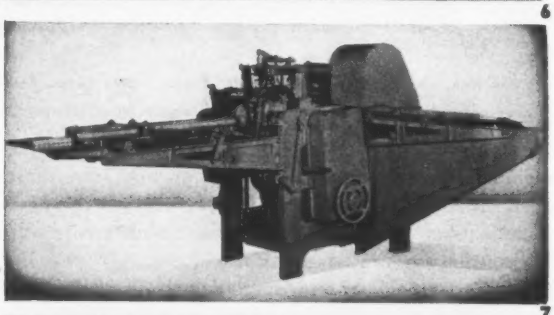
Other types of machines are available which are adjustable for the wrapping of a variety of bakery products at high speed, capable of wrapping products 3—6 in. wide and 1—5 in. high. The speed range is 35—50 cakes per

5—This equipment wraps candies in small cartons, then cellophane wraps filled cartons at 150 per minute. Photo, U.S. Automatic Box Machinery Co., Inc. 6—Bandage wrapper, adjustable for various widths and roll sizes. Photo, Richard Machine Co. 7—Semi-automatic machine cellophane wraps flat packages in crimped style. Photo, Miller Wrapping & Sealing Machine Co. 8—Wrapper for candy and other irregularly shaped items. Photo, Lynch Manufacturing Corp.

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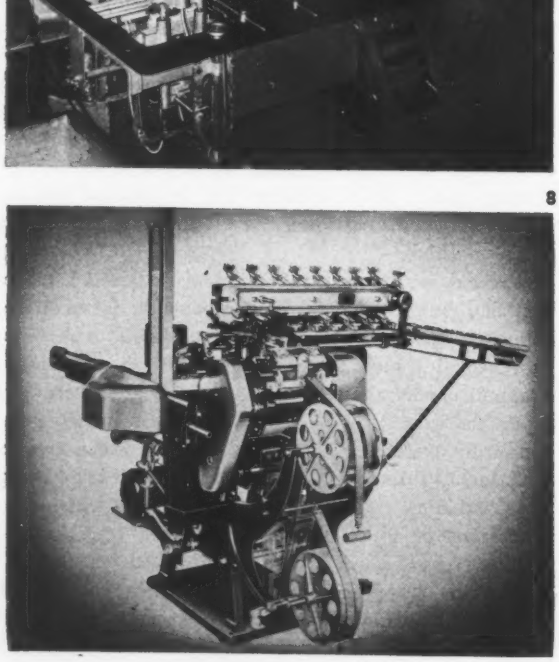
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9—Machine which is designed to wrap 5 bouillon cubes in a packet at the rate of 60 packets per minute. Photo, Richard Machine Co.

minute. Semi-automatic types are of great use in the moderate-sized bakery where a wide variety of types and sizes is handled. In many of these machines a variety of units can be wrapped without changing the size or shape of the container. In cases where a major size change is needed, this can be accomplished through the interchange of simple parts.

Wrapping irregular objects

During recent years there has been progress in the wrapping of objects which are irregular in shape. Transparent film has been the favorite material, and it has been widely employed by cake-bakeries, although textiles, garments, confections and other objects which can be carried on a cardboard support have been so wrapped.

Obviously, any irregular object can be wrapped in an automatic machine if it is placed in a carton or in a four-sided tray. The other extreme is to wrap the object without a carton and without any cardboard support at all. As an alternative, it is possible to use either a scored flat card automatically formed in a wrapping machine to form a "U-board," or to use a simple flat card without scoring or forming.

Sometimes, as in the case of such very delicate merchandise as iced cakes, pies, etc., the "U-boards" also give physical protection against crushing, and they also produce a surface against which to make the end folds.

"Underfolding" on automatic wrapping machines was developed primarily to assist in the wrapping of objects of irregular shape, or items which are so thin that an end fold cannot be produced practically. Machines are now on the market which will produce either end folds or underfolds with a very simple adjustment and without the addition or removal of extra parts. Almost any piece of merchandise coming within the maximum and minimum limits of the wrapping machine can be handled at a relatively high speed if it will rest in position on a simple cardboard support.

One method of wrapping individual pieces, articles or packages is with a heat-sealing machine which takes the heat-sealing film from a roll, automatically forms a tube, and makes a longitudinal heat seal, hermetically sealing the article in the film. Two packages are made

during each cycle of this machine which has duplex heads and can produce 60 complete packages per minute.

When printed film is used, the printing can be registered by means of a photo-electric registry attachment, or continuous printing can be employed for this purpose. An interesting method of registration employs a miniature printing press, using quick-drying aniline ink and geared to the paper feed of the machine. The press prints material as it is being fed from the roll into the machine. With this press, registration is automatically taken care of, without the use of an electric eye.

Wrapping chewing gum

The use of strong wrapping materials has resulted in the development of easy-opening devices such as tabs, tapes and machine-made nicks to facilitate the opening of the packages. Such devices are now being used extensively on small packaged goods.

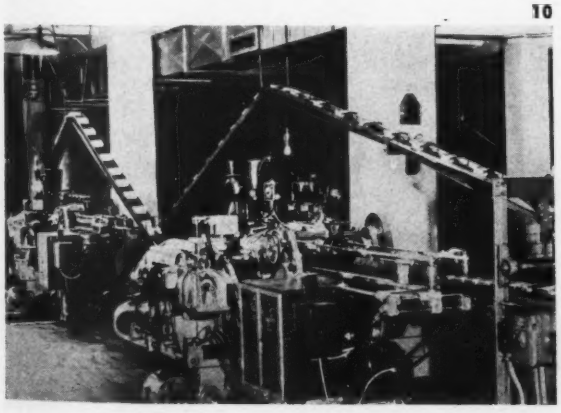
The wrapping of chewing gum is receiving much attention at present because of the development of high-speed automatic wrapping machines. A machine is now available to wrap small individual sticks of gum at a speed in excess of 600 per minute. The machine will apply an inner wrapper fed from a roll and a printed band fed in sheet form. A thin strip of adhesive will glue the outer wrapper to the inner and prevent its slipping off the end of the stick. Individual sticks in regular sizes are being wrapped with an inner roll-fed wrapper and an outer printed label, at speeds up to 400 per minute.

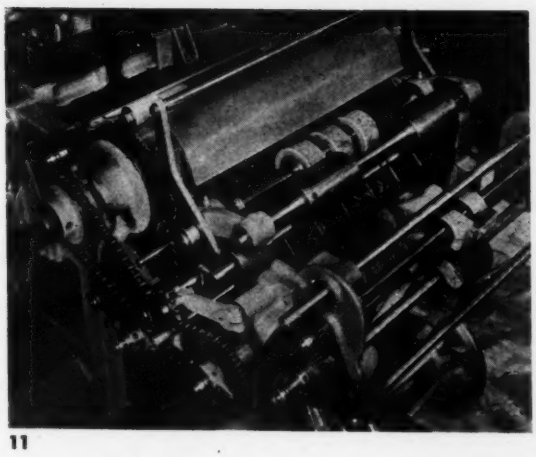
The usual 5¢ package is being produced on single high-speed machines which can wrap the single stick at 1000 per minute. The single stick has an inner wrapper of dry wax or foil and a label fed from a roll. Five of these single sticks are then assembled, and an outer, overall, roll-fed wrapper, tightly sealed and including the zipper tape, is applied.

In considering machine wrapping, three elements always enter the picture—speed, adjustability and price—and the three are intimately related. The more specialized the machine, the higher is possible production, and the more difficult it is to change the size. At one extreme are the high-speed chewing-gum machines just mentioned; at

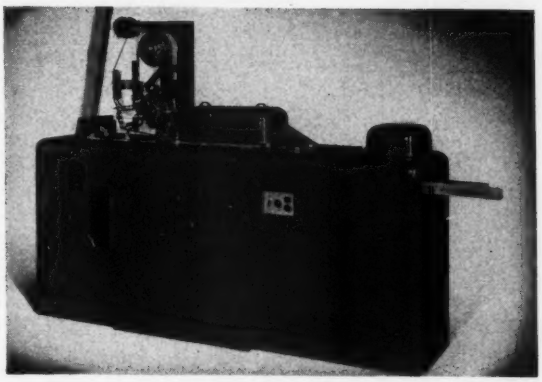
10—Automatic Battle Creek machines wrap 65-80 cartons of Junket Freezing Mix in laminated foil or glassine per min., register design by electric eye and seal the cartons at Chris Hansen's Laboratory, Inc.

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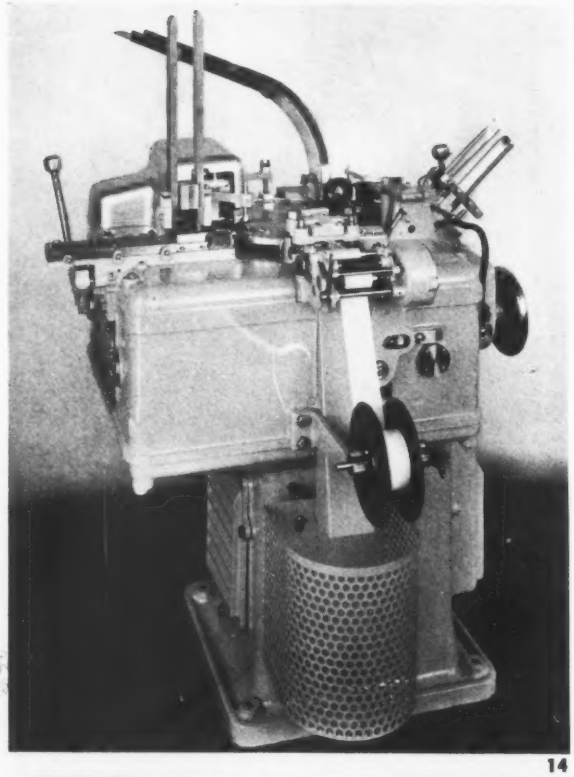


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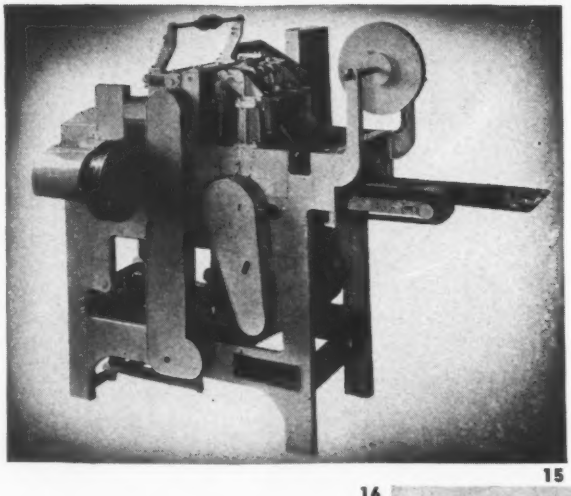


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11—A device for the cutting of small slits in the cellophane wrap which is used on many tomato packages. The cellophane is cut as it passes over a rubber roller located under the cutter. Photo, Package Machinery Co. 12—Cellophane wrapping machine for applying tear strips. Photo, F. B. Redington Co. 13—Equipment for wrapping irregularly shaped objects. Items are wrapped in sheeting which is fed from a roll and heated under electric plates. The seal is formed by twisting the finished package. Photo, Stokes & Smith Co.



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the other extreme are the carton-wrapping machines, based on the principle of bread wrappers, where a size change can be made in less than five minutes over a wide range, but where speed is limited to slower operations.

Semi-automatic machines

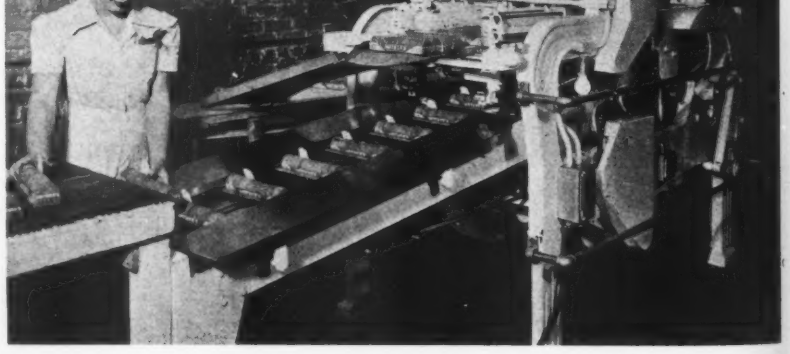
Semi-automatic wrapping machines require a smaller investment and permit extreme flexibility with regard to size and nature of packages. Versatility of machines extends beyond mere "adjustment range." It permits the wrapping of irregular, loose or stacked items or packages, because of close contact of the operator with the folding operation. The odd package can be guided by hand just enough to make allowance for its peculiarities. Examples in this category include packages composed of several loose pieces, as when four bars of soap and a wash cloth are wrapped together.

The semi-automatic machine will wrap with a variety of materials, either heat- or glue-sealed, including heat-sealing cellophane, waxed papers, waxed foil and the non-heat-sealing materials, such as plain transparent sheets, kraft and other ungummed or unwaxed papers. If a manufacturer of pharmaceuticals should desire to wrap his packages first individually in heat- or glue-sealing cellophane, then bundle them by dozens in kraft paper, the semi-automatic would perform both jobs, laying glue on the kraft paper to seal it.

Instant adjustability makes the semi-automatic wrapping machine suitable for very short runs. On a moment's notice, it can be changed over from the smallest to the largest package within its range.

Speeds of semi-automatic machines, while naturally less than those of fully automatic ones is adequately high to exceed, by many times, that of hand wrapping and wrapping by means of simple fixtures and jigs. In some cases, particularly where frequent adjustment is required, or where great economies in wrapping materials are possible, the semi-automatic shows even greater savings than the automatic. Each machine has its place and they seldom overlap.

Packages produced on semi-automatic machines are uniformly neat and well sealed, whether with heat or glue. When heat-sealed, the hot plates are kept under



14—Both inner and outer wrappers are applied to double-edge razor blades by this machine at the rate of 150 per minute. All of the working parts are run in an oil bath. Photo, Package Machinery Co. 15—A bouillon-cube wrapper which wraps 100 cubes per minute. Photo, Richard Machine Co. 16—Cookies are wrapped in boats by this machine which then automatically heat seals the labels. Photo, Oliver Machinery Co.

thermostatic control, so that there is no injury to either the wrapper or packages. Packages containing heat-perishable goods, such as chocolate, butter, icings, frozen foods and the like, can, if necessary, be passed quickly through the heat-seal region, so that a seal takes place, but the heat cannot penetrate far enough to be injurious. When glue is used for sealing purposes, the amount of flow and area of application can also be positively controlled, so that results are unerringly the same and the machine user can have confidence in the uniformity of his product, both in appearance and protection afforded by the wrapper when applied by this efficient method.

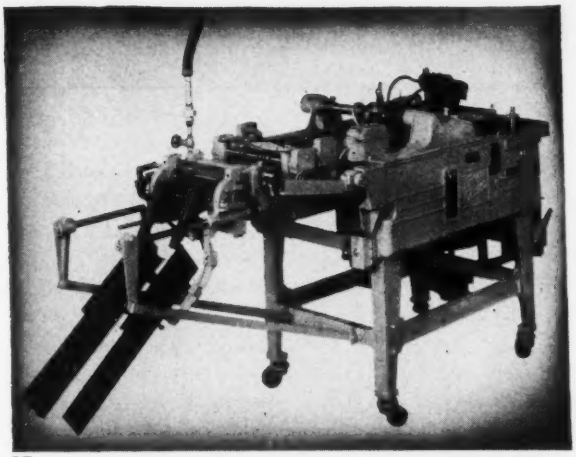
Bottle wrapping is another achievement of the semi-automatic wrapping machine. Using many of the principles of the package wrapping machine to retain the valuable feature of adjustment for many sizes, this equipment also provides a clever means of neatly tapering the cellulose wrap from the shoulder to the cap of the bottles.

Ordinarily, the semi-automatic machine folds and seals the wrapper over the bottom and two ends of the package in the manner that an ordinary biscuit carton is usually wrapped. However, where a very shallow package is to be wrapped, where the ends do not offer sufficient depth for a satisfactory end seal, the end folds can be tucked under the ends of the package or "underlapped." This feature is useful on flat packages, such as cake slices, sheets of writing paper and even extension-edged candy boxes, which are recessed at the sides and at the ends so that a conventional seal is apt to be entirely impractical.

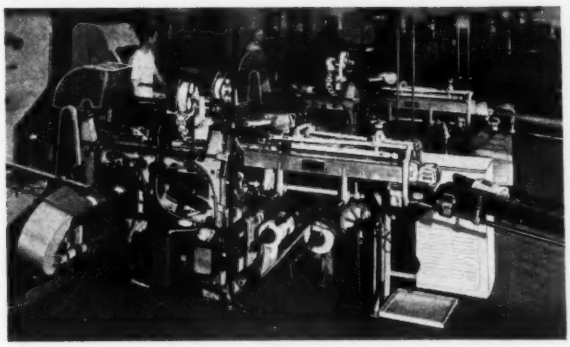
The semi-automatic wrapping machine can also be furnished with a number of money-saving attachments, such as a coding device for perforating letters or numbers in the wrapper, or a banding attachment for attaching printed bands to the wrapper.

Hand-wrapping fixtures

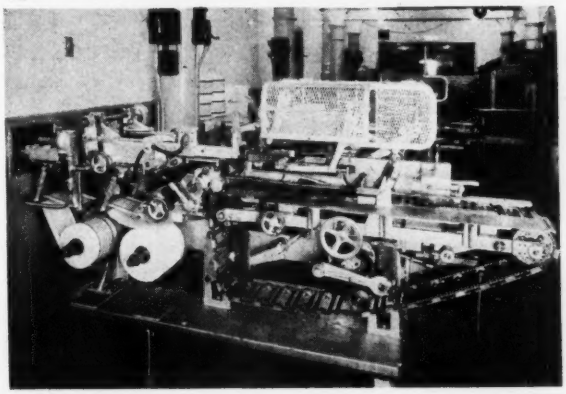
Many simple and inexpensive tools have been developed, in recent years, to aid hand operators in wrapping heat-sealing materials. These include hot plates of various types upon which a package may be placed momentarily to achieve a seal. Where line seals or spot seals are desired, special heating irons, equipped with thermostatic controls and similar in appearance to soldering irons, are sometimes utilized.



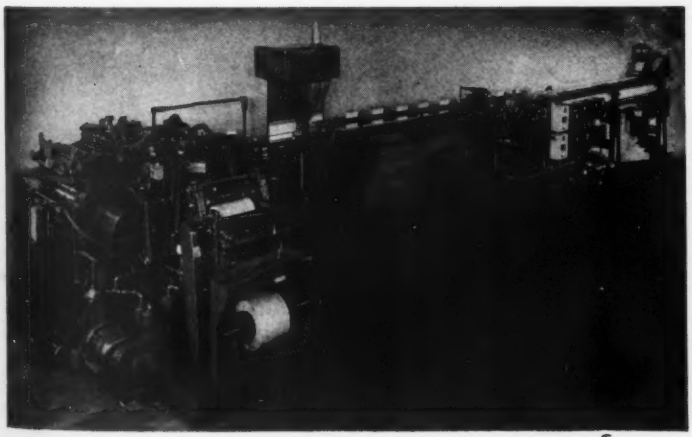
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17—Equipment for the making of small pouch bags. Photo, Simplex Wrapping Machine Co. 18—A battery of bread-wrapping machines which are equipped with attachments for applying end labels. Photo, American Machine & Foundry Co. 19—Yeast-wrapping machine in foreground slices 1-lb. yeast cakes and wraps the sliced groups at 60 per minute. Photo, Battle Creek Bread Wrapping Machinery Co. 20—Double wrapping machine can produce a securely sealed "package within package" at rate of 60—70 per minute. Photo, Pneumatic Scale Corp., Ltd.

Tight-wrapping equipment

Because of its specific value in keeping the weevil from infesting package contents, cereal manufacturers were the first to adopt the tight or wet wrapping of cartons, so designated because the inside surface of the wrapper is covered wih glue and thus it cannot be removed from the carton.

Today the general utility of the tight wrap is recognized, and this technique is standard for many food and grocery lines. (For a description of loose or removable wrapping and equipment, see *Wrapping Equipment*, p. 654.)

With the tight-wrapped package, the plain unprinted cartons are filled and sealed in the regular way by any one of a number of semi-automatic and full-automatic carton-filling and sealing machines which are available on the market.

After the carton has been filled and sealed, it is fed into the tight-wrapping machine which automatically feeds the paper label as the carton enters the wrapping machine, glues the label all over on the blank side with a thin coating of adhesive, and wraps it tightly around the filled carton, making a perfectly tight-sealed, non-sifting, weevil-proof package—and one which is also attractive. Various types of cartons with inside bags or liners can be used with the tight-wrapped package, and different types of opening devices may be employed.

In the salt industry, the tight-wrapped package is now being used by many of the leaders, and one of the most satisfactory salt packages comprises a carton made of asphalt-lined board which is tight-wrapped on the outside. For coffee, wax or parchment paper liners are generally used on the inside of the carton and the cartons are tight-wrapped on the outside. For flour, the regular chipboard carton is used and some of the packers use a blue lining on the inside of the carton in order to give a whiter appearance to the flour.

Many combinations of carton, liner and label may be used with this method, and their proper selection will insure the product against damage while it is on its way to the consumer.

The tight-wrapped package has a special advantage for the packer or manufacturer who packs private-label brands for different customers. With the tight-wrapped package, he can use the same carton for many products, and merely have different labels for the different brands. This means a saving since it is not necessary to have a number of different printed cartons on hand. (See *Contract Packaging Service*, p. 87.)

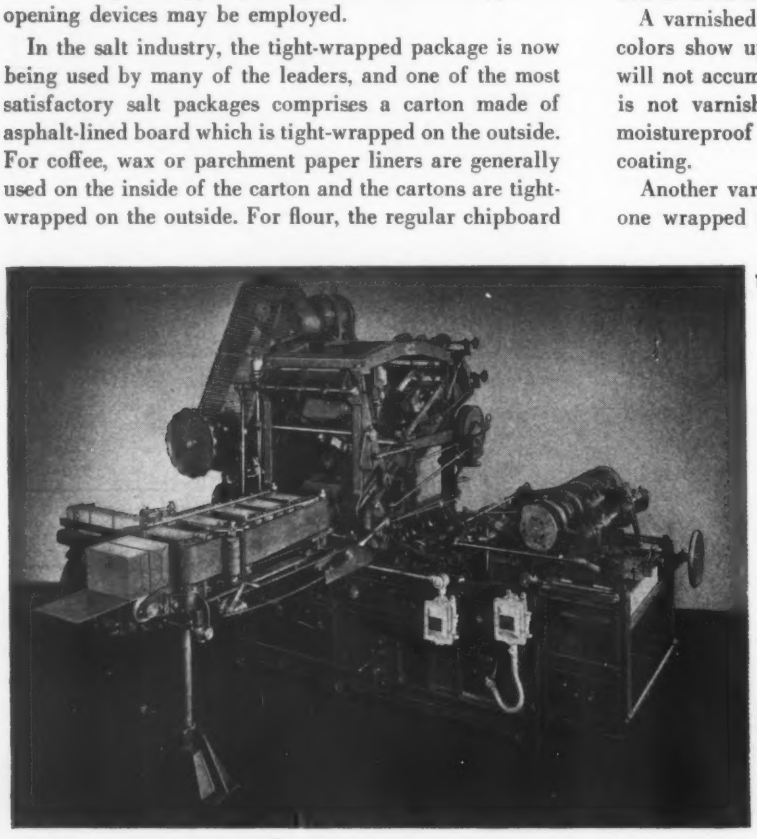
With the tight-wrapped package, labels with various types of end folds can be used. Some are die-cut so that each end flap of the label is glued down separately. Others are rectangular, making a gusset fold on the end.

Varnished, foil and waxed tight wraps

Recently the varnished label has been adopted by a number of packers and manufacturers employing the tight-wrapped package. Packages so wrapped are ideal containers for a wide variety of food and grocery products now on the grocers' shelves.

A varnished surface makes the package attractive; the colors show up to advantage and the varnished surface will not accumulate dirt or dust as quickly as one which is not varnished. Also, this type of package is more moistureproof since the varnish provides an additional coating.

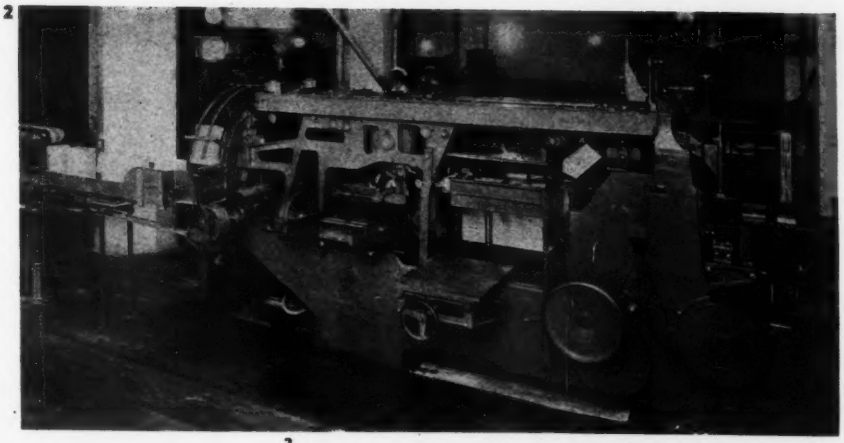
Another variation of the tight-wrapped package is the one wrapped with a metal-foil wrap. In this case, the



1

1—This automatic tight-wrapping unit applies printed wrappers to medium and large carton shells. The wrappers are fully glued to all of the carton surfaces and may be handled in sheet or in roll form. An operator is needed only to replenish the supply of wrappers and glue. Speed range for equipment is 40—70 cartons per minute. Photo, Pneumatic Scale Corp., Ltd.

2



2—A tight-wrapping installation which is fully automatic and handles a range of sizes and end folds. It has a speed of 60—70 per minute. Photo, Stokes & Smith Co. 3—All-over printed labels are glued and sealed on unprinted cartons to make tight-wrapped packages.

labels are made of metal foil laminated to paper so that the outside of the label is the printed metal foil and the inside is paper. The inside can then be glued uniformly to the carton.

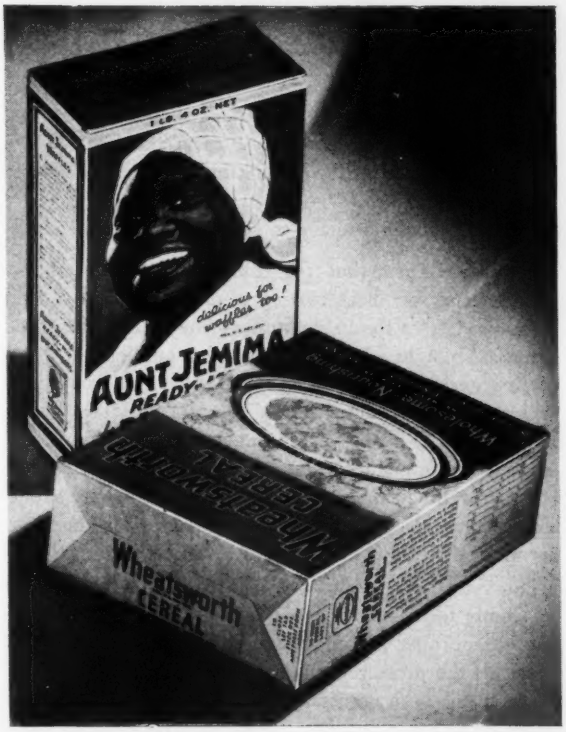
Another development combines the advantages of tight-wrapping and wax-wrapping at a low cost. This is accomplished by printing and waxing only one side of the sheet of paper and gluing the underside to all four sides and top and bottom of the plain carton. This development has been made possible through the perfection of electric-eye methods of registration which permit roll-feeding of the printed and waxed stock.

Roll-feed and electric-eye registration can also be applied to regular unwaxed tight wrappers, an advantage worth considering because roll-printing is less expensive than printing in sheets.

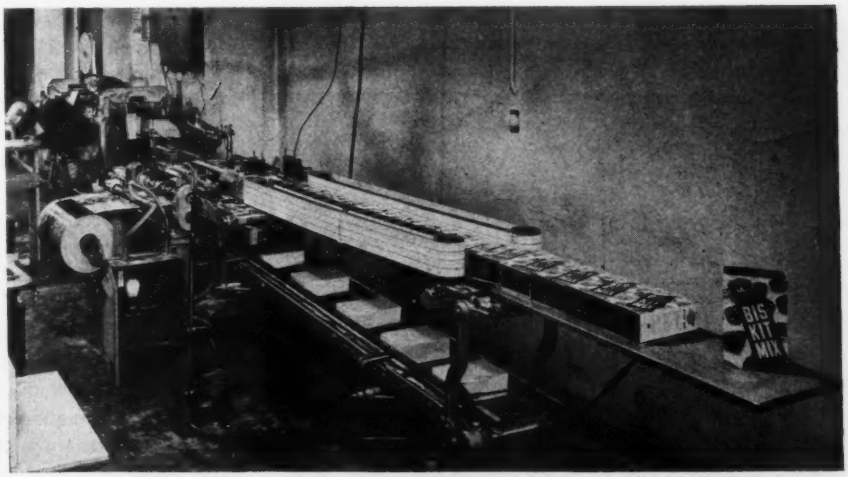
Adhesives

Depending upon the requirements of the individual package, the range of choice in adhesives is wide. For packages tight-wrapped in ordinary paper a cold vegetable dextrine adhesive soluble in water is used. For varnished and foil wraps, several kinds of moistureproof adhesives are on the market. Substitute adhesives which are made of latex are also now available. (For fuller information see the chapter on *Adhesives*, p. 331.)

3



4



4—Tight-wrapping machine equipped with electrically controlled paper-feeding mechanism which measures and cuts sheet, registers it around the package. It wraps with heat-sealing cellophane or waxed paper. The wrapper is sealed with electrically heated plates. Photo, Hayssen Mfg. Co.

Heat-sealing equipment

Heat-sealing machines may be classified in two categories: the reciprocal or jaw-type sealer and the rotary sealer. The simplest form is the jaw-type which consists of two heated metal plates which are brought together either by manual or motor-operated mechanism. The rotary sealer consists of two heated rollers through which the bag top passes, these rollers being motor driven. (For additional information on this subject, see *Heat-Sealing Principles*, p. 348.)

The question of whether to use a jaw-type or rotary sealer is dependent largely upon the type of material to be heat sealed. A study of the factors necessary to make a good heat seal will help in the selection of the proper type of machine. These factors are:

1. The temperature used to furnish the heat
2. The pressure with which the layers are held in contact
3. Time during which hot contact is maintained

Specific information regarding temperature control requirements for heat sealing a given material should be secured from the bag supplier—the data having been given to him by the fabricator who applied the heat-sealing agent to the film or sheet. Some materials heat seal at 140° F., others as high as 500° F. The job of heat sealing a given bag is made easy or difficult, depending on how much temperature variation can be permitted for the seal in question. The higher the sealing temperature and the greater the rate of heat consumption, the more difficult it is to hold a given temperature.

Laminated and multiwall bags play a large part in packaging today, and they suffer most from the application of improper sealing temperatures. No one material offers all the protection necessary for wartime packages. Hence it has been necessary to combine various kinds of materials to make multiwall bags. The material in these bags may be laminated or not; some bags are composed of as many as 12 layers of material. This presents a problem to the heat sealer, because it is difficult to get a good heat seal on the innermost surfaces of the bag. This seal must be accomplished without injuring any of the other layers of bag material. Laminated bags offer a particularly difficult sealing problem, because most of the laminating agents have lower melting points than the sealing temperature of the heat-sealing film. For this reason it is desirable to seal the bag at the lowest possible temperature. This may be accomplished by increasing the pressure factor somewhat and adjusting the timer period so that the heat can pass through the several layers and bring about a heat seal on the innermost surfaces. An example of this is found in a bag which when made singly will heat seal at 200° F. with the pressure applied for half a second. The same material made into a bag of three or four thicknesses should be heat sealed at the same temperature. However, this is not possible where production is a factor. It might be found that the time period required to seal the laminated bag at 200° F. would be 10—20 seconds. Obviously this rate of speed would make the heat-sealing operation a bottleneck in production. It is therefore necessary to compromise and raise the temperature and decrease the time factor. The quality of this seal will depend upon the judgment of the person making the adjustment in the time-temperature-pressure relationship.

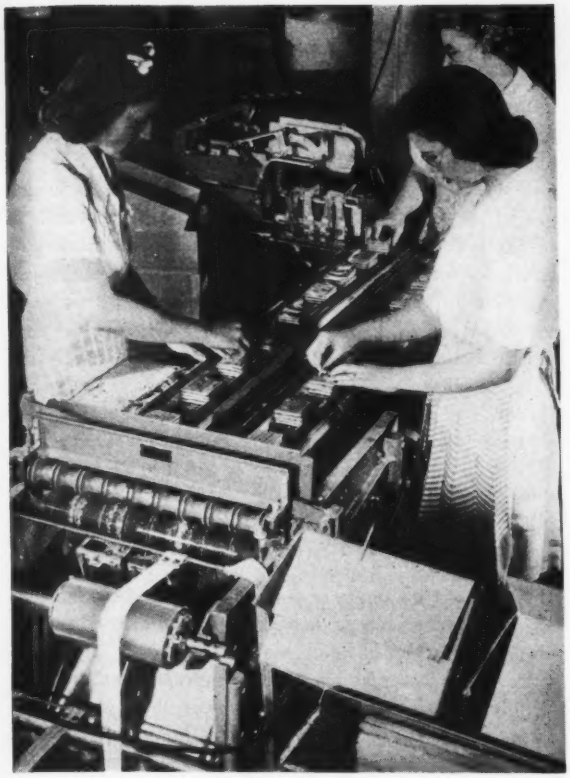
The user of a heat-sealing machine is naturally desirous of learning how to recognize a seal made at the proper temperature by its appearance. On opaque lacquer-coated materials, the sealed area must be pulled apart to be examined. If the seal is blistered or brittle or if the lacquer has been squeezed out of the seal to a smoky appearing area adjacent to the heat seal, the temperature was too high. On transparent materials, the above conditions can be observed without destroying the seal.

The presence or absence of a transparent heat-sealing lacquer on a given material is difficult to determine except in a laboratory. One supplier has recently tinted his heat-sealing agents so that their presence or absence can be determined. When a heat seal made on such material is pulled apart, the presence or absence of color in the heat-seal area enables the user to determine whether or not a bond has been made between the two surfaces. It is to be hoped that this or other methods of lacquer identification may be further developed because it is of considerable benefit to the user of heat-sealing materials. It should be pointed out here that in making a heat seal, the temperature of the heat-sealing agent should be raised to the point where the agent is plastic and not liquid. If the agent is brought to the liquid stage it may be squeezed out by the pressure factor or driven into the film on which it is based.

1—*Mechanical rotary sealer for high speed. Bags traveling on conveyor are fed to machine by operator. Photo, Amsco Packaging Machinery, Inc.*

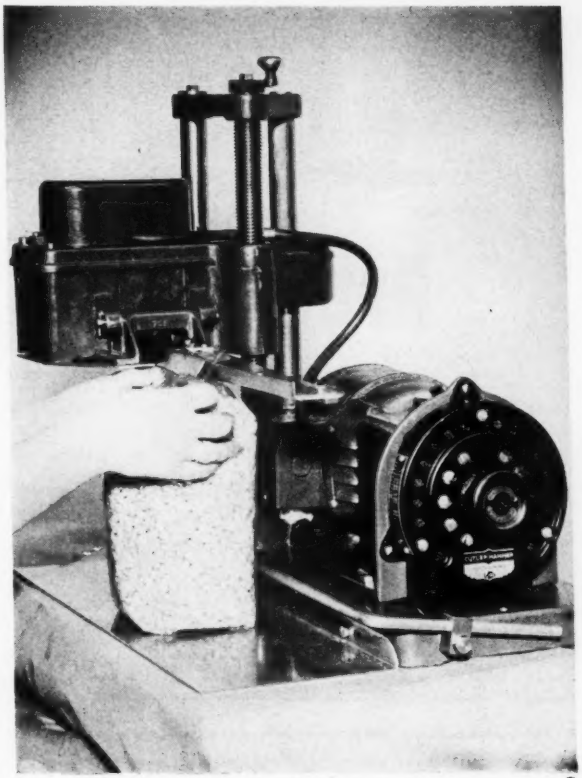
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2—*Machine in foreground glues, cuts and delivers cellophane sheets, then overlaps wrapping when Ration biscuits are put in place. Other machine folds, seals. Photo, Miller Wrapping & Sealing Machine Co.*



3

3—*Many products may be packaged with the aid of such semi-automatic rotary heat sealers. In this illustration, the operator is shown guiding the bag to the sealing rollers. Photo, Wrap-Ade Machine Co., Inc.*

Lacquer-coated materials have a useful life depending on their ability to hold the moisture which is part of their makeup. If they lose this moisture they become brittle and fragile. A heat seal made at too high a temperature drives the moisture from the material in the heat-seal area and accordingly shortens the life of the bag.

The pressure factor is fairly easily controlled. The seal should be made with the least possible pressure, particularly where laminated materials are used.

The time factor limits the production pace of the bag-sealing operation. When additional production is desired there is a tendency to cut down the sealing time. It is important to note that the heat and pressure should be applied for as long a period of time as is compatible with production requirements. A test can be applied to see if the temperature is too high by momentarily increasing the time factor. If a damaged seal results, this is evidence of excessive heat.

Heat-sealing agents

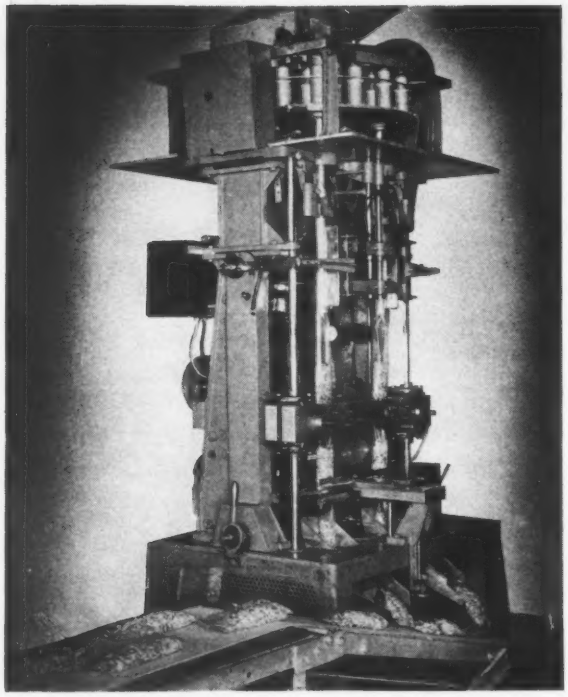
The two common types of heat-sealing agents are the lacquer type and the hot-melt type. On the first of these, time, heat and pressure factors are very important, because of the minute quantities of heat-sealing agent on the bag material. This quantity is so small that the slightest wrinkle in the bag seal will cause a "pipe" or leak through the seal. Some users maintain that jaw-type machines are better adapted for lacquer-coated films, while rotary-type sealers with preheating elements and cooling pressure belts do well on hot-melt coatings.

The heat seal on hot-melt coated bags and laminated bags should be kept at least $\frac{1}{8}$ in. from the bag top, to prevent bleeding of the heat-sealing or laminating agents. The user of heat-sealed bags will find that his bag supplier is familiar with various types of heat-sealing machines and is generally in a position to recommend the type of sealer which should be used on the bag he supplies.

Types of machines

Rotary and jaw-type bag sealers usually have sealing members which are made of brass and heated by electricity. Steel members are sometimes used because of better wearing qualities. The thermal conductivity of steel is slow, hence steel members are recommended only for automatic machines which handle bags at fixed speeds. This regular feeding rate permits the adjustment of the heat input to the heat output.

Most bag-sealing machines are semi-automatic, that is, they operate at the will of the operator. If possible, they should be fed the same number of bags each minute, for variations in feeding speed induce variations in temperature. If the bagging operations are intermittent, it is desirable to accumulate a batch of bags so that the sealing operations can be regular. This regularity in sealing



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4—Rotary heat-sealing machine which forms, fills and heat seals up to 50 packets per minute with roll-fed film. Photo, Stokes & Smith Co.

operations permit fairly easy matching of the heat input to the heat output.

Temperature controls

Thermostats are generally used to control temperature on the sealing and preheat members. For reasons given above, sealing machines are furnished with excess heat capacity. This excess heat capacity causes temperature variations in spite of the thermostat. The thermostat cuts off the heat when the temperature reaches a certain point, but all of the heat which is in transit from the heating element to the sealing surface continues to that surface with the result that there is an over-run in temperature. This over-run depends on the mass of the sealing member and the rate at which it is being heated with relation to the rate at which the heat is used. For example, a bag-sealing machine may be furnished with enough heating capacity to heat the sealing members to 500° F., but the particular material to be heat sealed requires only 250° F. and the thermostat is set at that point. When 250° F. is reached, the thermostat cuts out, but the heat in transit continues to rise so that an over-run of possibly 20°—40° may occur. A lag below 250° F. will probably also occur for the same reason. Both the over-run and the lag result in improper seals.

The remedy for the above condition is to use a rheostat as well as a thermostat. These should be adjusted so that the thermostat turns on and off frequently. This is possible because the rheostat can be set to absorb the excess heat capacity. By this means it is possible to regulate the heat input so that it is only slightly more than the heat which is taken away by the bags when they are sealed.

A small signal light should be hooked in with the thermostat so that it will indicate when the current is on or off, which will act as an additional safeguard. A person adjusting the heat control can determine by test approximately how many seconds the light should be on and off and advise the machine operator to this effect. If the operator notices that the light is on or off for too long a period of time, the person who makes the adjustments can be notified. A sudden change in temperature may be due to a foreign substance on the sealing members, a variation in the electric current supply resulting from additional loads being thrown on, a window or door nearby being opened or closed, the room temperature being raised or lowered, the turning on or off of fans or blowers and many other causes. Despite the excellence of the heat controls in any machine, it is recommended that a check be made on the quality of the heat seals at least every 15 minutes.

Pressure controls

All the sealing jaws or rollers must be clean, so that they permit the free passage of heat and allow intimate contacts with the bag being sealed.

Provisions for making pressure adjustments are provided in each sealing machine. As the machine parts wear, the pressure will grow less and this should be observed closely and checked at least once a week. The pressure on rotary sealers can be increased by inserting stronger springs and in jaw-type sealers, the pressure may be increased by shimming one of the sealing jaws. When the time factor has been adjusted to its minimum, it is sometimes possible to increase production by having the operator seal two bags at once. Production can be increased by having the machine operator release the bag as soon as it is gripped by the sealing jaws. The operator can then use the dwell, or time that the heat or pressure is applied, to prepare the next bag for the sealing jaw. The machine should be positioned so that gravity will remove the sealed package from the machine without additional handling.

It should be noted that manually operated jaw-type sealers are not recommended for any critical packages. On such machines, the time and pressure factors are dependent upon the human element.

Heat-seal crimps

Many people consider the indentation in heat seals to be there for a decorative effect and many packers of heat-seal bags have selected crimpings or configurations for appearance rather than utility. On a heat-seal package, these indentations are widely termed "crimps," with the result that many bag-sealing machines are called "crimpers."

The question of whether or not to crimp, the directions in which the crimp should run, the angle and pitch of the crimping teeth are all determined by the type of material being heat sealed and the ultimate result the crimping is supposed to accomplish.

As a general rule, flat jaws or rollers (that is, without

crimping teeth) should be used on paper or cloth on which a heat-sealing coating has been applied. The paper or cloth generally resists the crimping action and has a tendency to flatten out when the heat and pressure are removed. If for any reason paper material has to be crimped, care should be taken to see that the crimps are so arranged that they will run parallel to the grain of the paper.

Cellulose materials are capable of being stretched under heat and pressure and a crimp seal on such material is stronger than a flat seal. These materials will stand a fairly severe angle in the crimping teeth, a 90° included angle being widely used.

Mounted heat-sealing foil can be crimped, provided the pitch of the teeth is not too coarse and the included angle of the teeth is not less than 130 degrees.

Laminated materials, other than cellulose sheets, should not be crimped, as their thickness is such that the crimping action does not reach surfaces to be heat sealed.

Crimping teeth are commonly cut in three directions. The first is called a vertical crimp and the crimps are parallel to the sides of the bag. The horizontal crimp runs across the top of the bag. The diagonal crimp is described by its name. The strongest seal is made by a vertical crimp, but this type of seal is not liquid-tight. The horizontal or diagonal crimp should be used where liquid tightness is a requirement.

Ordinarily the width of a seal should not be greater than 1 inch and ½—¾ in. is usually wide enough. It should be remembered that in a given sealing machine, as the area of the seal is increased, the pressure per square inch is lessened.

Bag materials

Bags are as strong as the material of which they are made. Each material has a certain useful life and care should be taken to see that bags which have lived half their lives in a warehouse or storeroom are not used in critical packages. It should be realized that the cost of a bag is a small factor in the cost of the completed, delivered package. There are some converters who make their bags to a high standard and they should be encouraged. Bags should be used in the order in which they are purchased; the first bags into a plant are the first bags out. Bags should be stored under proper temperature and humidity conditions as this will increase their life.

Bag loading

The usual way of getting an object or product into a bag is to open the bag and place or drop the article into it. This method has been used since bags were first made, but it is not recommended for large bags. A suggested method is to place the product to be bagged on a tray, the dimensions of which are somewhat less than the inside dimensions of the bag. This tray has to be supported above a table in such a way that the bag can be slipped over the tray upon which the object rests. One end of the tray serves as a "shoe horn" and permits the bag to be slid over the tray in such a way that the bag is not injured. The bag and contents are then slid off the tray. This method is necessary when the bag is to hold a number of objects and hold each object in fixed relation one to the other. This method is also desirable when the weight of contents might injure the bag in loading.

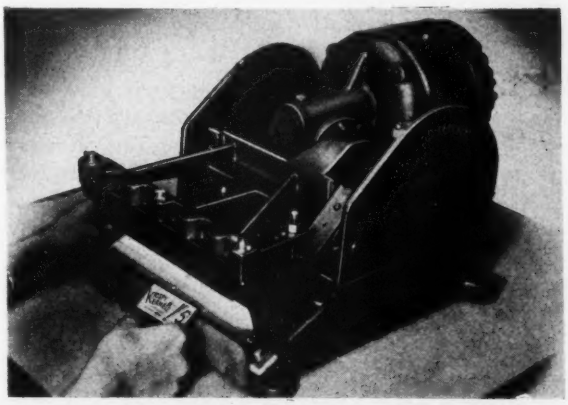
Air exclusion

Having loaded the bag properly, it should then be taken to the bag-sealing machine. Before being sealed, it is absolutely necessary that as much air as possible be excluded from the bag. Enough air must be excluded to permit the bag walls to be free from tension. Otherwise any slight drop or concussion will cause the entrapped air to break out through one of the heat seals of the bag. Means of excluding air are several: a partial vacuum may be pulled on the bag before sealing, or the bag may be filled with some gas which can escape through the bag walls after it is sealed, or pressure may be exerted against the front and back of the bag so that these surfaces are concave when the bag is sealed. If a liquid or semi-liquid is being sealed in the bag, it is often possible to raise the load line by exerting pressure on the exterior of the bag and in so doing exclude part of the air which would normally be between the load line and the bag seal. Too much emphasis cannot be placed on this air-exclusion.

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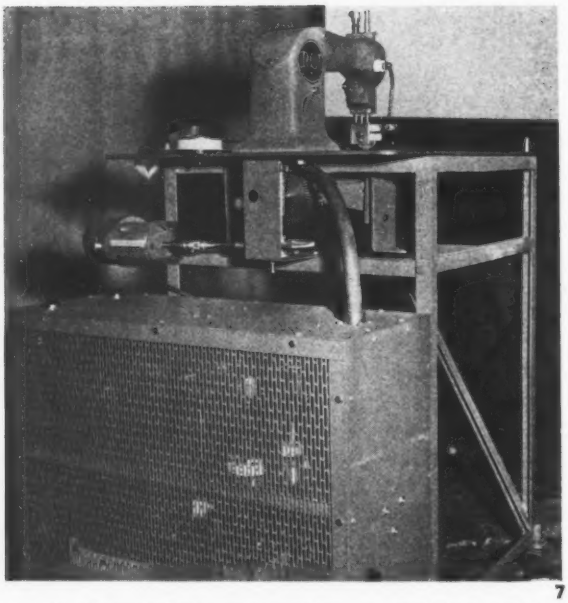
5—Jaw-type heat sealer which is used on combination or double packages. Photo, Wrap-Ade Machine Co., Inc. 6—Hand-operated heat sealer has a thermostat with variable adjustment so that it may be employed for light or heavy materials. Photo, M & R Manufacturing Co.

5



6





7

7—This rotary electronic sealing machine, an experimental model, is equipped with a power-transmitter unit. Photo, Radio Corp. of America.

Combination and double packages

The bag-and-carton package comprises a heat-seal bag in a carton. The bag offers protection to the product while the carton protects the bag and carries the load. To make sure there is no weight against the bag surfaces, the bag should be larger than the inside of the box. This ensures that each part does only its own job.

The bag-in-box package can be divided into two types. The first can be called a "combination package" because the bag is of such type and material that it must be assembled with the box before being loaded. This combined package must be handled manually in the filling, the bag-sealing and in all of the carton-closing operations. This is awkward unless one end of the carton has been closed by gluing, an operation which can be performed on a certain top-or bottom-sealing machine. The closing of the carton, after the bag has been heat sealed, cannot be done readily on a carton top-or bottom-sealing machine.

The second type can be called the "double package." It consists of a bag-in-a-box, but the bag itself is of such type and materials that it is strong enough to be handled as a single package. It can be opened, loaded and sealed by itself. It is then inserted into a carton, which carton can then be glued automatically on an adjustable carton sealing machine. Many of the 5-oz. egg powder packages, shipped on Lend-Lease, are double packages.

Sealing by electronics

One development promises to employ radio-frequency power to good advantage in the packaging field, particularly with respect to heat sealing. Experimental equipment has been produced by the Radio Corp. of America, Camden, N. J., which bears out these promises. The unit consists of a radio-frequency transmitter which generates the power, applied by means of a mechanism that resembles a sewing machine.

This transmitter connects to an ordinary 110-volt A.C. circuit and raises the frequency to as high as 60,000,000 cycles with control of the voltage. To operate the experimental unit requires a 50-watt transmitter, but the principle is applicable in units with a maximum of 15,000 watts. The material to be heat sealed is placed between two electrodes of the machine attachment, and the heat—through the action of the radio-frequency power—is generated in the material and is therefore maximum at their interface, that is, where the two surfaces meet.

This principle contrasts with the ordinary heat-sealing method in that the latter operates by the penetration of the heat through the film. This means that the maximum heat is applied at the outer surface instead of where the two surfaces meet, and it diminishes as it approaches the interface. This calls for accurate control of the three factors in heat sealing—temperature, pressure and time.

Practically all existing equipment utilizes electrically-heated plates or bars which clamp together the two films to be sealed. The heat is thermostatically controlled and the surfaces of the plates may vary from 100°—500° F. But the setting of the thermostat by no means ensures maintenance of the proper temperature, due to the fact that the heating plates may cool as successive pieces of material are operated upon.

The electrodes are not heated at all—they are placed so that the current passes from one to the other through the dielectric material which is being sealed, with instantaneous and uniform heat throughout the material. At the spot where the two surfaces meet, the thermoplastic coating is fused or welded into a heat seal.

The principle of radio-frequency heating has many possible applications, as in the molding of plastic materials and in wood laminations. Its chief interest for packagers, so far as can be predicted now, will doubtless be in heat sealing of containers made of materials which have been developed since the critical shortages of tin and other important substances have occurred.

The new electronic machine applies the power at the meeting point of the two metal wheels or electrodes which are made to revolve by means of a small motor. The material passes between these wheels in much the same manner as cloth goes through a sewing machine but instead of stitching a seam the wheels fuse the edges of the material together. It is believed that there may be considerable advance in the accuracy of temperature control with radio-frequency power, and that the time and pressure elements, which are largely a matter of mechanics, can be regulated as independent functions.

Not all materials can be heat sealed by this method—only dielectric (non-conducting) substances responding to it. For example, rubber hydrochloride sheeting forms what appears to be a perfect seal when treated by this method. On the other hand, metal foil, being a conductor of electricity, is not in the slightest degree affected even when coated with heat-sealing compound. Coated glassine and vegetable parchment appear to seal effectively, whereas cellophane and waxed papers are less successful.

Carton loading and closing equipment

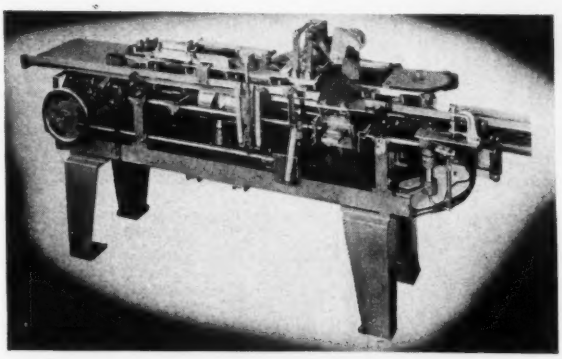
Generally speaking, the term "cartoning machinery" refers to equipment which performs the operations necessary to bring the carton from its collapsed state to its fully packed state. That is, it feeds the collapsed carton from a magazine, expands the carton, inserts a solid item (or a number of solid items) into it and closes the carton. The type of cartoning machine with which this article is concerned is rarely used in connection with dry, free-flowing items which must be weighed before insertion into the carton. The type of equipment appropriate for cartoning such products—coffee, dry cereals, etc.—is discussed in the article entitled *Weighing and Filling Dry Products*, p. 635. The following paragraphs deal with machines suitable for cartoning tubes of tooth paste, shaving cream, various bottles and jars, razor blades, chewing gum and many other miscellaneous items, including printed matter.

Whether or not a prospective purchaser of cartoning machines or a producer of cartoned products is warranted in planning for the use of cartoning machinery depends upon a number of factors. First, of course, there is the matter of the number of packages he is required to produce daily or weekly. Secondly, there is the nature of his package.

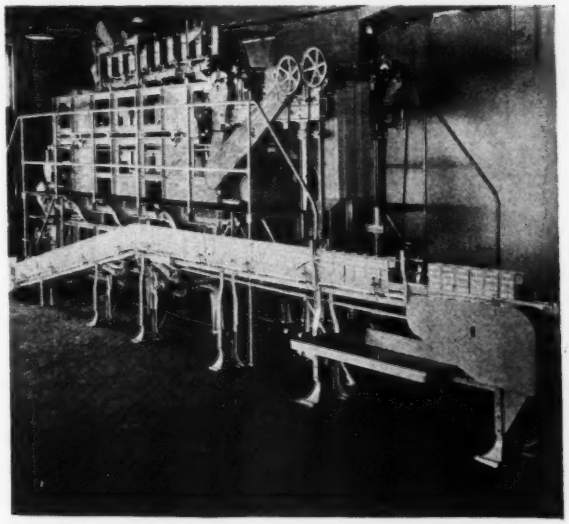
There are some cartoned products which can be packaged quite economically by hand. Others, because of their more involved nature, are prohibitively expensive to package by hand. The best procedure involves the submission of packages to carton machinery suppliers who can, after a study of all the factors involved, recommend either an existing machine in their lines of advise concerning the modification of one of these machines to suit the job at hand.

In general, there are two types of cartons which are handled by automatic cartoning machinery. Most commonly used is the tucked carton equipped with top and bottom flaps which are tucked into position by the fingers of the cartoning machine. The other type is known as the glue-end carton. This is used in cases where tamperproof seal is desired or where the weight of the product would open the bottom tucks of the tucked type. In some instances, cartons are used with a combination of glued flaps at the bottom and tucks at the top. A third type is the die-cut but unglued carton which is set up and closed automatically. This type is used for the packaging of crackers, lard, shortening and other similar products.

The range of cartoned products is tremendous. Packages of razor blades stand, perhaps, at the end of the size scale. From this point, they range upwards to the large

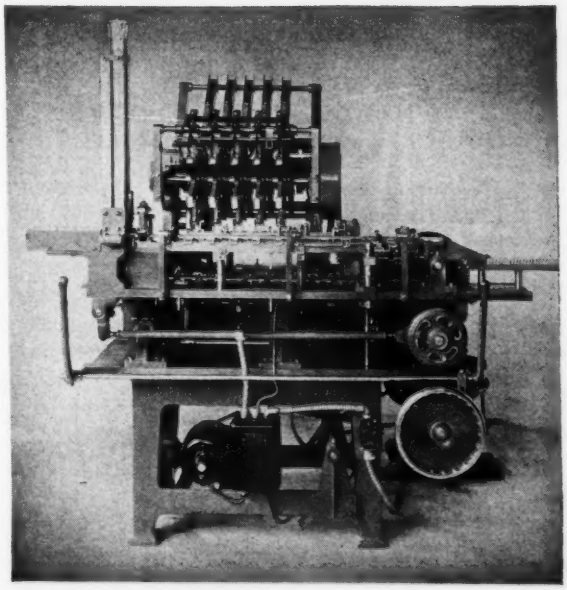


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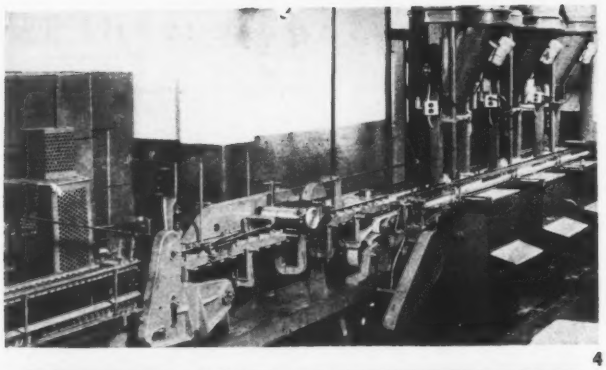


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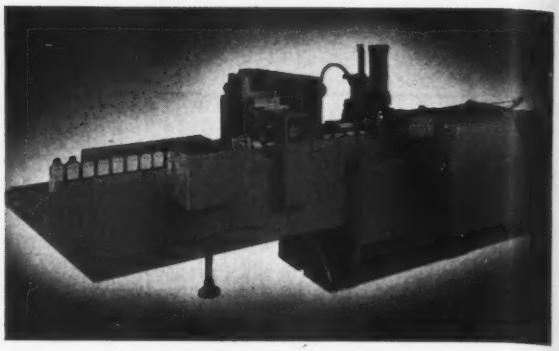
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1—Automatic carton folding and closing machine. Photo, Peters Machinery Co. 2—Feeder end of a feeder, liner and bottom maker which handles flat cartons at the rate of 90 per minute. Photo, Battle Creek Bread Wrapping Machine Co. 3—Fully automatic cartoner for double-edge razor blades. Photo, U. S. Automatic Box Machinery Co., Inc.



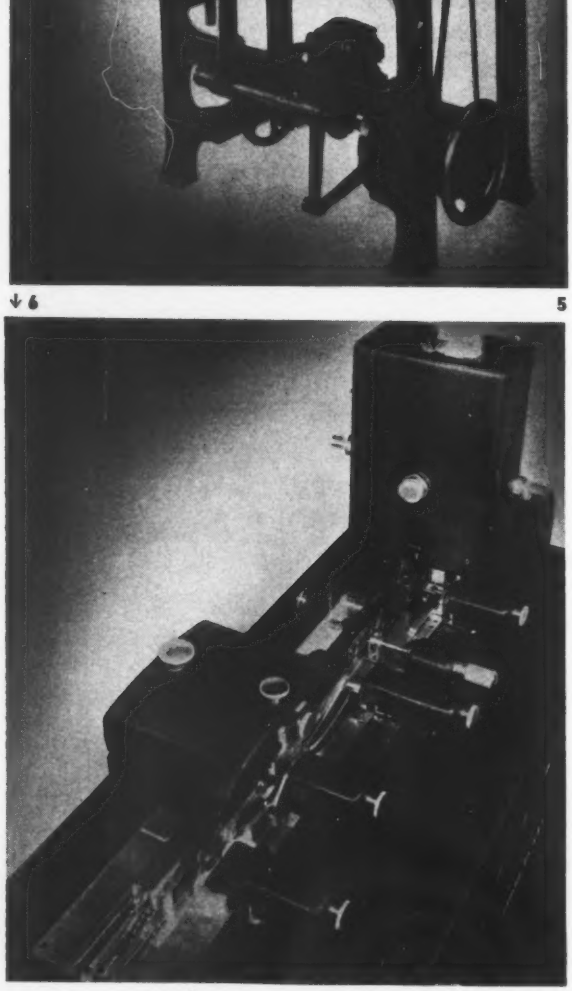
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4—Automatic carton sealing machine which can be coupled with automatic feeding units at right. Photo, Stokes & Smith Co. 5—Small unit for forming and closing cartons sets up to 35—40 per minute. Photo, Peters Machinery Co. 6—Semi-automatic carton set-up machine with a range of 40—120 per minute may be easily and rapidly adjusted to different sizes. Photo, A. H. Ross & Co. 7—Fully automatic adjustable cartoning machine with adjustable bucket. Photo, F. B. Redington Co.

cartons which are used for the packaging of macaroni or cleansing tissues.

The efficient speeds at which cartoning machines now operate depend to a great extent on the nature of the product to be handled and the size of the package. Several well-known 5¢ packages of candy-coated chewing gum, containing 12 tablets, are automatically produced on machines that operate at speeds of 100—160 packages per minute. Safety razor blades are automatically counted out and cartoned at speeds as high as 240 packages per minute. Bars of soap and similar products are automatically cartoned by efficient machines at speeds of 150 or more units per minute.

New machines of this type have been invented to perform war jobs, and some of them may well find a place in the rebuilding of civilian industry. There are, for example, machines which load ammunition into standard boxes at a great saving in man-hours over the methods formerly employed.

One of the most interesting of these is a .30-calibre box loader with an automatic hopper feed. In this case cartons are made with a special liner in cardboard sections so that each cartridge is kept separate. The cartridges are dumped into a hopper at the upper end of an inclined chute from which they slide down into runways for filling.

After being aligned, the cartridges are fed into guides which curve downwards so that the cartridges are brought into a position where they are pointing horizontally. From this position, they are fed into the machine proper. There are in all, four complete stations on this carton loader, each comprising a hopper, a first and second pocket-wheel combination, a chain lug pusher and a transport pusher. The set-up cartons with separators are fed into an inclined magazine feed by an operator who stands behind the machine. The carton-carrying chain runs continuously, and at the end of the operation the filled cartons land upright or on end on a belt discharge with high side guides.

Collapsible tube filling

In the selection of tube-filling equipment, three important factors must be given due consideration: the consistency of the material, the range of tube sizes and the daily production rate.

Liquids and semi-liquids which are self-leveling and which flow by gravity are the least difficult to handle because the material will run into the tube from the top, will fill uniformly and will be free of air bubbles. Furthermore, the material can be easily fed to the hopper of the machine and will flow down through the hopper, by gravity, into the filling mechanism. Tooth pastes, shaving creams and similar materials that will not flow by gravity must be filled by placing the filling nozzle down into the bottom of the tube and filling from the bottom up to prevent air pockets. In most cases, the filling pump will pull the material down into the hopper, but if the material is "short" and breaks apart, an impeller-type agitator must be used to force it down through the hopper. Creams, ointments and similar pastes that will not normally flow by gravity can sometimes be made to flow by warming them. The machine, in this case, is equipped with a jacketed hopper and an agitator to keep the material at a uniform temperature and it is also equipped with heated filling parts. Before adopting this method, it is important to determine whether the material shrinks on cooling, as any shrinkage will draw the walls of the tube in and give it an empty appearance.

The majority of the machines on the market will handle tubes up to 1½ in. in diameter by 6 in. long and many of them will handle tubes up to 1½ in. in diameter by 7 in. long. Hand-operated equipment will handle somewhat larger tubes, but the semi-automatic and automatic machines must be modified to handle tubes over 7 in. in length.

The production requirements will, of course, determine whether hand-operated, semi-automatic or full-automatic machines should be used. All are available and range in capacity from approximately 100—7000 units per hour.

Machine types

Equipment for filling, closing and clipping collapsible tubes may be purchased for as little as $275 and will put up 10—20 tubes per minute, using three operators. Two types of hand-operated filling machines are available, one for liquids and semi-liquids and the other for pastes. Both are easily adjustable and both fill the tubes as accurately and as cleanly as does power-driven, automatic equipment. The filled tubes are then transferred to a small, hand-operated folding machine which applies a double fold or which can be furnished to apply the quadruple fold. A third operator indents the folds such as on clipless closures, or clamps on a clip, by means of a foot-operated press. Certain models can be equipped with electrically-heated jaws for applying the hermetic seal described below.

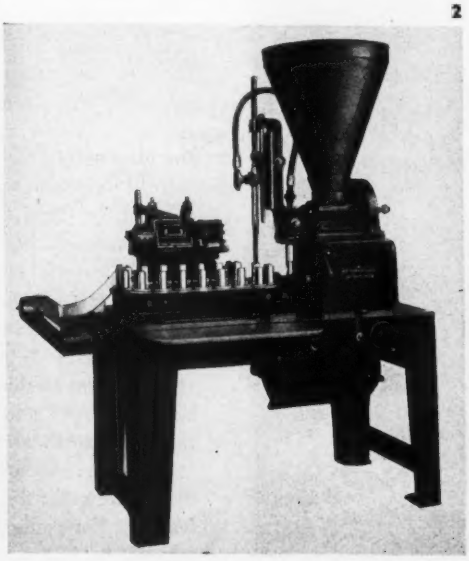
A production of about 30 filled and sealed tubes per minute can be achieved by using a general purpose filling machine and then transferring the tubes to a second machine which folds the ends and seals them. Two operators are needed. In the case of liquids, it is possible to put a filling attachment directly onto the folding and sealing machine, in which case one operator can fill, fold and seal up to 30 tubes per minute. These machines can be equipped with variable speed drive, so that the speed of the machine can be adjusted for individual jobs.

For the manufacturer who has a varied line of products, several makes of completely automatic tube-filling,

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1—Machine for filling tubes with liquids, ointments or pastes at a rate of 25 per minute. One operator is required. Photo, F. J. Stokes Machine Co. 2—Tubes of tooth paste, shaving cream, ointment, etc., are automatically filled, closed and crimped by this type of equipment. Photo, Arthur Colton Co.



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3—This filler operates at high speed and is designed to fold tubes and, after filling, to apply a welded seal. Photo, Karl Kiefer Machine Co.

closing and sealing machines are available which will handle up to 50 tubes per min. with one operator. These machines will handle both pastes and liquids, since the tubes are raised up over the filling nozzle and are filled from the bottom up. The machines can be set to make a plain double fold, a quadruple clipless fold or the hermetic seal. The operator simply places the tubes into the tube cup and registers them so that the trademark or printed matter on the tube will be in proper relation to the fold. Ejection is automatic onto a conveyor.

A full-automatic machine is available with four filling heads capable of filling up to 120 tubes per minute. This machine automatically removes the tubes from the shipping cartons, registers the printed matter by means of a photo-electric cell and fills, closes and discharges.

4—Versatile equipment which is able to fill collapsible tubes, fold the bottoms and then crimp them. Photo, Arenco Machine Co., Inc.

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The simplest type of closure is a plain double fold. This is neat and attractive in appearance and is sufficiently strong for materials, such as rubber cement and glues, which automatically harden and prevent further seepage in the event they leak through the fold. It is also satisfactory for thin pastes and similar materials which are easily extruded and do not strain the fold when forced out of the top of the tube. This double fold can be strengthened considerably by indenting the metal.

Clipless closures

So-called clipless closures consist of a quadruple fold, reinforced by corrugations. The ten layers of metal which result are as strong as a clip and considerably more resistant to seepage and leaks.

When the tube is folded, the walls come together and give the tube a wedge-like appearance. The volume of the tube is reduced considerably and the material is forced up toward the fold. For this reason, tubes must not be filled more than about $\frac{3}{4}$ or $\frac{7}{8}$ full.

Substitute tubes

If collapsible tubes of substitute materials come into common use—and those who are developing them are confident that will be the case—filling and closing equipment will need to be modified somewhat. One company has developed a device or change-part to heat seal the clipless closure. Careful temperature control is required. One material calls for temperatures of 110°—120° Fahrenheit. Higher temperatures will melt the substance, while lower temperatures fail to form the seal.

The alternative is a metal clip-type closure. For this type, the machines must be adapted so as to overcome the natural rebound of the material of which the tube is made. The all-metal tube is ductile and holds its shape when the pressure is exerted in applying the clip. But this is not the case with a tube made of a substance which springs into its original shape.

The spattering of material on the inside closure wall before closing is often the reason why the material seeps through the closure. Spattering in turn is frequently caused by drip from the filling nozzle. There are several machines on the market today using different methods for eliminating the drip from the nozzle—one by blowing the drip into the tube, and the other by sucking the drip up in the filling nozzle. Both methods effectively aid in keeping the closure walls clean.

If the material is such that dripping cannot be avoided, or if it creeps badly, there are means for coating the inside closure wall and subsequent application of heat produces a perfectly sealed closure. During the past few years several methods for welding the tube closure have been developed and are in use today. Such closures will then be hermetically sealed.

One type of machine is equipped with automatic cap tightening and tube cleaning and has the no-tube, no-fill feature. For coding purposes the closures can, on some machines, be imprinted with numbers or characters.

Bag filling and sealing

Until recently, there has been inadequate provision for efficient bag filling and sealing on a large production scale. For this reason, bags were normally used only by small producers who depended wholly or partly upon hand operations for accomplishing these functions (see *Specialty Flexible Containers*, p. 261; *Merchandise Envelopes and Packets*, p. 267, *Bag Sealing and Closing*, p. 278).

In order to take proper advantage of the available automatic and semi-automatic equipment for efficient closing of stiff containers, large producers have been partial to the use of this type of container for their products—figuring that the saving of cost by efficient production outweighed the excessive cost of the package itself.

Today, however, the picture is different. Automatic machinery for bag filling and sealing is available which can perform one or all of the necessary operations. The machines can feed the bags, form them, open them, fill them, check-weigh, and close and seal the bags.

Automatic machines for the manufacture of bags and envelopes usually make bags with center seals and with bottoms which are folded up or crimp sealed. The equipment can make single- and double-wall bags. It can form them of unprinted material or material with continuous or random design, or it can produce spot-printed bags to perfect registration.

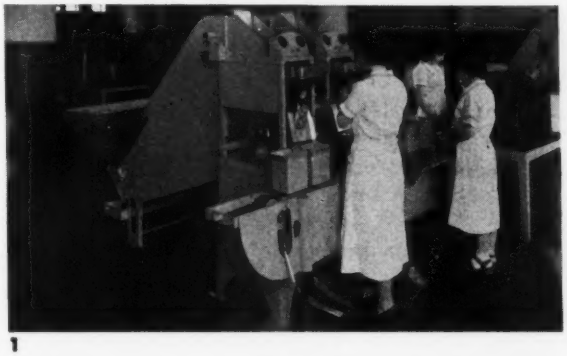
A high rate of production is attained by the machines in the manufacture of uniformly produced, perfectly sealed and unusually strong bags. Machines are made in various ranges, some making bags as large as 17 in. wide and 60 in. long.

Such provisions as automatic labeling for custom packing and tube making, are also available.

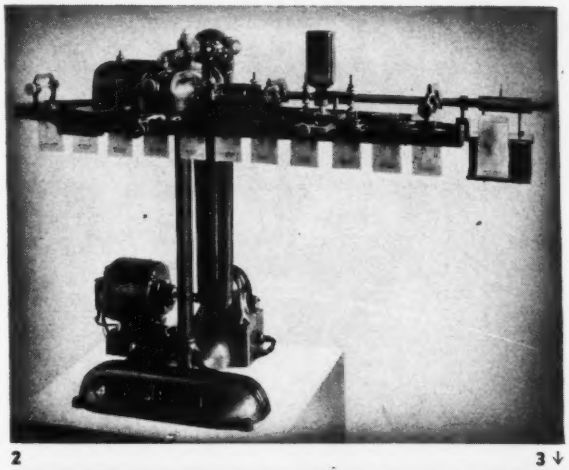
Machines are now obtainable for making pouch bags by one of two methods. Either two rolls are run with sealing surfaces meeting (in which case two parallel and one right-angle seal are made), or one roll is used, the material being folded in half and two parallel edges sealed. For maximum protection, it is sometimes desirable to seal at the point of fold.

These machines were primarily designed for metal foil and asphalt-laminated stocks, and printed or unprinted material can be handled. Bags as large as 24 in. wide by 60 in. long can be accurately and perfectly made.

Rotary-type bag-sealing equipment has met with great demand because of its high productive capacity and the simplicity of its operation. This type of machine may

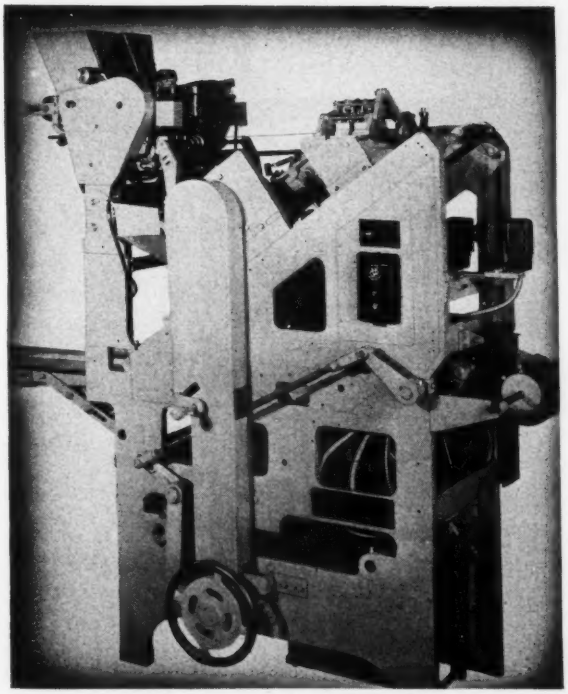


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1—Equipment for weighing and filling candies in cellophane bags of various sizes at 20—25 per minute. Photo, Triangle Package Machinery Co. 2—This rotary-type bag sealer handles a range of materials and sealing methods. Photo, Amsco Packaging Machinery Co. 3—Machine for forming, filling and top-sealing of cellophane bags at rate of 45 per min. is equipped with a double net weigher. Photo, Richard Machine Co.

be used adjacent to filling equipment. Thus filling and sealing, though two distinctly separate functions, can be combined into an operation which can be performed by but one operator without any loss of speed. The rotary machine may be used in conjunction with belt conveyors for the maximum utilization of its capacity. In many such cases, no operators at all are required.

These machines are available in models adaptable to the requirements of all materials whether they be glue sealed or heat sealed.

For specialized packaging of war matériel in pouch-type bags, supplementary equipment has been designed. This equipment makes it possible to open, form, fill and seal the bags on a straight-line, high-speed basis with extreme care in the handling of the matériel.

In addition, such provisions as roller conveyors, belt conveyors and air extractors complete the efficient handling of otherwise difficult bag-packaging work.

Introduction of automatic bag-packaging machinery has, in some industries, resulted in a surprising change in the appearance of the bag itself, for the automatic machine is capable of producing a bag closely approaching in appearance the neatness and attractiveness of the finest stiff containers. With these design potentialities to work with, bag suppliers and bag users have turned from the cruder forms of bag decoration to the use of the more attractive and decorative outer bag materials.

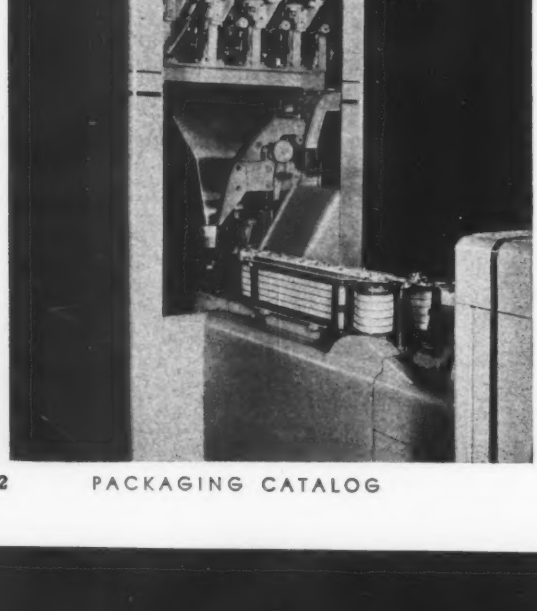
Developed in almost every case to meet the specialized needs of a single producer or industry, bag filling and sealing machines have come to form a specialized group.

4—Tape sealer sews heavy cotton cord over closing tape. Handles 12 or more per minute. Photo, Bemis Brothers Bag Co. *5—Automatic bag-sealer weighing unit and discharge-settling conveyor for 30 per minute. Photo, Consolidated Packaging Machinery Co.*

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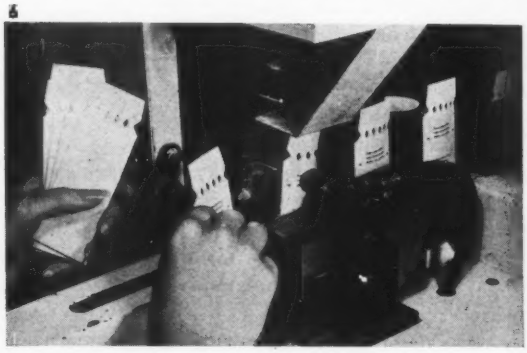


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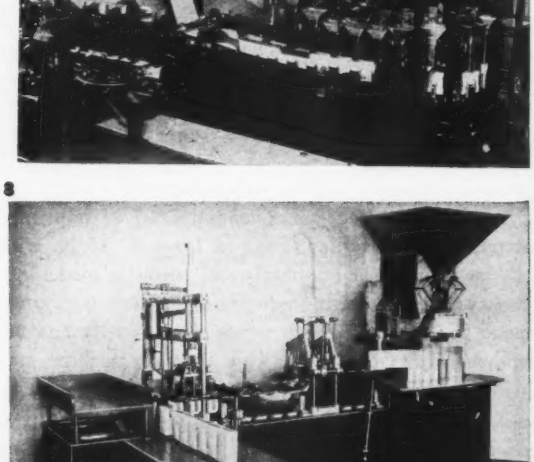


6—Filling envelopes with sulfa drugs. Photo, Frank D. Palmer, Inc. *7—Tea-bagging machine forms and fills bags, sews closure, applies string and tag. Photo, Pneumatic Scale Corp., Ltd.* *8—Coffee packer fills, weighs, seals bags. Photo, Arenco Machine Co., Inc.*

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Inspection on the production line

by H. A. Sumner

Quality control involves a number of factors. First it is necessary to have a quality conscious organization. From the doorman to president, the whole organization must be quality conscious. Standards of quality must be arrived at, points of control established, personnel selected and adequately organized and trained. The personnel department must understand the quality problem and exercise appropriate control in the selection of workers. Thorough inspection must be conducted from the time of the receipt of raw materials till the shipment of the manufactured merchandise. Without this background, inspection on the production line, with which this article concerns itself, is almost useless.

Points of inspection

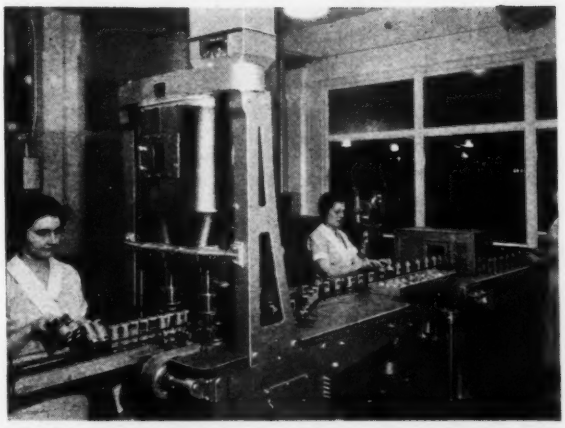
The selection of inspection points is a technical matter which the plant engineer, the production manager or whoever is responsible for quality should work out very carefully. In order to reduce waste, it is desirable to detect any defect at the earliest possible moment. It is also desirable to be sure that the finished product is perfect in every respect. The problem requires rather careful study of the processes and a balancing of the risks against the expenditure involved. Too much inspection is apt to prove ineffective in the long run. On the other hand, many production executives have discovered to their sorrow that they cannot economize at the expense of inspection. The idea that because an inspector does not appear to be very busy he can just as well do a few other off jobs is entirely erroneous.

Organization of inspection personnel

The organization of inspection personnel offers problems, and the same solution does not fit every condition. The type of person, however, who makes a good inspector is the same in every plant. He is, of course, extremely conscious of his responsibility; his technical knowledge must be of the best; he must be careful, painstaking and proud. In addition to this, he must be tactful and understanding. An arbitrary and disagreeable inspector can do more to wreck the quality of a production line than almost any other single element. It is not easy to find a person who meets these specifications, and it is the management's function to provide the training and the encouragement to develop this type of individual. Either the personnel department, the training department or the production manager of the plant must shoulder this responsibility. *(Continued on next page)*



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1—Every detail of inspection all along the line is important. This pressman checks the quality of printed matter. 2—The operator at extreme right is inspecting completed packages before packing. 3—Here an operator is checking packages as they pass along assembly line. Imperfect ones are rejected before packing. Photos, Norwich Pharmacal Co.



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4—Each member of the inspection personnel must be well trained and well equipped. In this method of inspection of the finished package, a mirror is used to aid in examination. 5—The inspection of cartons of cosmetics before they are packed helps ensure delivery of the product in good condition, cuts down consumer complaints. 6—After labeling, products should be carefully inspected. Photos, Norwich Pharmacal Co.

How should inspectors be organized? Should there be a separate inspection department under a chief inspector who is responsible for quality and responsible only for quality, or should the responsibility be left to the foreman of the production line or to the department or division head? My belief is that even in large organizations an inspection department which maintains inspection on production lines and can over-ride the department head is a dangerous setup inviting conflict. However the line foreman, even though he is imbued with a good sense of quality, is under such pressure for production that he is very apt to accept results incompatible with the highest standard of quality.

On the other hand, if the division or department head is big enough for his job, he certainly will know very definitely the relative importance of quantity and quality. He should know that the easiest and quickest way to remedy a defect is not to limp along and accept a high percentage of rejects, but to stop the production line, correct the trouble as soon as he can.

In view of this, it has been my experience that if production line inspectors are made responsible directly to the department head and are given authority to insist that a line be closed down if the quality is poor, very excellent results are obtained. Of course, occasionally a conflict may arise between inspector and line foreman, but the tact of the inspector and the judgment and diplomacy of the division head can easily smooth the situation. If the whole personnel, including the line foreman, is sufficiently sold on the quality theme, such conflicts will be very much less frequent. Of course, definite responsibility for the quality must rest with the inspector and the department head. To avoid unnecessary conflict, it is important that means be provided for placing this responsibility if failure occurs.

Tools of inspection

The tools of inspection are important and will be more so. The war situation has developed a number of devices which assist the human inspector to do his job better and more quickly and some of them eliminate the human element altogether.

Automatic weighing and sorting devices have been used for a long time, although some very clever new ideas are making their appearance. Electronics are providing the quality engineer with really miraculous tools. It is hopeless to attempt to enumerate the variety of items available to help with the inspection job. There have been so many developments in this field, and it is so important, that the technical societies and trade journals could render great service by collecting and making available to all industry the mass of scattered information and methods of quality control that have developed. Of course, many of these devices cannot be passed on to industry as a whole until after the war, but manufacturers interested in strengthening their inspection systems should certainly investigate at length developments of the past few years. These new inspection techniques should be taken into serious consideration, studied with extreme care, and applied wherever it is practicable.

Box and bag stapling equipment

Great development has taken place during the past few years in the use of stapling as a method of closure for bags and boxes (see *Bag Filling and Sealing*, p. 671). Bag and box sealing with staples has grown from a spare-time job for retail clerks to a specialized departmental function. This growth has been fostered by the wide variety of stapling equipment which has been produced to meet specific needs. Whereas hand-operated machines are still in use, power-driven staplers and stitchers are effecting great savings in packing and shipping (see *Wire-stitching Machinery*, p. 678.)

Among the advantages of stapling as a method of closure is the fact that it is neat, secure and very fast. It does not impair the appearance of the container and the container may be used immediately, without waiting for an adhesive to set. Dampness does not cause the seal to loosen, with the danger of the contents spilling out, and it is practically impossible to remove the staple, and again seal the package without detection, thus reducing the danger of pilferage to a minimum.

Four types of closure are generally used in this bag-sealing work. The simplest form is where the bag is merely folded over at the top and fastened with one or two staples. Another method is the use of a cardboard bag top which folds over the top of the bag and is stapled through the bag, thus making a seal and furnishing a label at the same time. Where the bag is to be folded tightly over the contents, as in the case of a coffee bag, sometimes the two sides are folded in first and then the back and front folds lapped over each other and stapled with a single staple. When a non-sift seal is desired, a wide fold is made across the top of the bag and this fold is folded again, the sides being folded under at the same time. By inserting a stapling machine under the two ends of this fold successively and driving a staple in each end, a flat top, non-sift bag is produced.

Packers of asphalt, fertilizer and other heavy bulk products, who use multiwall paper bags, have discovered that stapling is an efficient economical means of sealing these bags. Bags up to 100 lb. capacity are handled easily and quickly on equipment especially designed for this purpose.

A very recent development in packaging is the heavy kraft shipping bag, which is used as a shipping container for coffee and other items, carrying 12 or 24 1-lb. bags. This container is especially adapted to motor transportation and is widely used by packers operating their own fleet of trucks. When filled, the sides of these bags are folded in and the back and front are then folded over each other and stapled with a hand-operated or foot-operated machine, depending upon the preference of the packager and upon the requirements of the case in point.

Users of corrugated containers have widely adopted stapling methods. Foot- or motor-operated bottom staplers and stitchers are used to seal the bottom flaps, while specially designed top staplers and stitchers are used on the tops. Some of these top staplers make use of a sealing blade which is inserted under the flap and a more modern development is a top sealing stapler which is operated from the outside of the closed container, closing its staple

1—Stitcher for heavy-duty multiwall paper bags. Photo, Acme Steel Co. 2—Hand stapler seals the tops of corrugated boxes without inserting blade under the flaps. 3—New bag sealer gives freedom of vision, has adjustable table to bring the bag to correct height. Photos 2 & 3, Bostitch, Inc.

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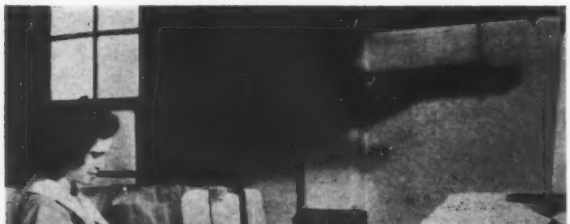


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4—Foot- or motor-operated stapler with adjustable-height table and sealing blade for large bags and top flaps of corrugated containers. Photo, Bostitch, Inc. *5—Double-head stitcher with bracket clinchers seals ice cream boxes for storage. Photo, Bostitch, Inc.* *6—A machine for stitching seams of shipping containers. Photo, Acme Steel Co.*

entirely from the outside and requiring the insertion of no sealing blade.

The smallest machines used for bag stapling can be operated in the palm of the hand. There are heavy-duty hand models of larger size, as well as a wide range of foot- and motor-driven machines all the way up to large automatic box stitchers. Complete information is available in the industry and it is an easy matter for the user to obtain the equipment that is exactly suited to the requirements of his particular work.

One of the widest uses of stapling in recent years has been in carding for display. Items of merchandise too small to possess sufficient attention-getting power or to carry adequate sales information are stapled to cards which present the message to the consumer. Such cards serve to identify the brand and the manufacturer, to convey a selling message that the article itself is too small to carry and the sales person too busy to tell, to carry directions and explanations that ensure the proper use and care of the product, etc.

Practically any items that can be embraced by a staple can be carded in this way. Bottles or other fragile merchandise can be safely and quickly handled, because the pressure of the stapling machine can be accurately controlled without variation and the staple can be firmly clinched with no appreciable pressure whatever on the object being enclosed.

Speed is a big factor in stapling. Whether operated by hand, foot or electric motor, the stapling machine clicks out the staples as fast as the operator can handle the work. Every click completes a stapling operation. It is much faster for most kinds of bagging and carding than tacking, riveting, gluing, hinging, sewing, hooking and taping operations—operations which involve materials of all kinds.

With staples, there is no waiting for adhesives to set and the staple will hold regardless of temperature or moisture. Furthermore, stapling machines are portable and can be placed wherever most convenient for the work in hand. For example, in retail stores, where prepackaging is to be done by clerks in odd moments, hand-operated machines are used on each counter where the work is handled. Manufacturers and distributors can better concentrate their work, and therefore they more often employ foot- or motor-driven machines for both packaging and display.

The automatic-feed staple hammer is also widely employed in packaging and shipping operations. Driving a staple like a double-pointed tack, with each single blow, this hammer is an efficient time saver.

On large production, wire stitchers are often used instead of staplers. A stitcher, in the parlance of the industry, is a machine which makes its own staples from a coil of wire.

Case packing and sealing equipment

Equipment for the case packing of cans consists essentially of a series of inclined runways which receive and gather cans as they roll off the conveyor lines, until the proper number of cans have been assembled to fill one layer in the shipping container. The cans are then pushed, horizontally, into the container by a hand- or electrically-operated device. If the container is of a type to accept more than one layer of cans, this operation is repeated a sufficient number of times.

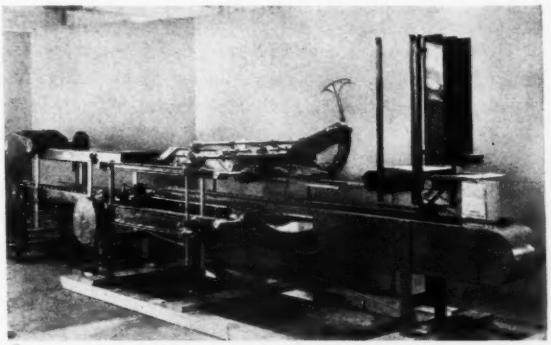
Bottle-casing units work on a similar principle, but use a vertical drop, rather than a horizontal push, to effect entry of the packages into the shipping container. Bottles come off the conveyor lines and are gathered over a grid which correctly positions them. At the proper moment, and under the control of the operator, the bottles drop into the shipping container which has been automatically raised until it rests just under the grid.

Carton packers have also been developed, working on principles very similar to those of the can packer with the exception that the rolling action of the can is replaced by a pushing action to get the various rectangular cartons into the proper position before placing the cans, en masse, into the shipping container.

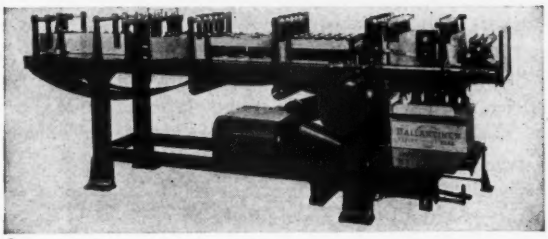
Once packages have been packed—by hand or by machine—it becomes necessary to seal them firmly for shipment. The simplest devices for this purpose are the hand glue sealers, which are simply adjustable pressure units mounted on top of roller conveyor sections through which the hand-glued cases are passed.

Case-gluing and sealing units of an automatic type receive filled, but unglued cases directly from the conveyor line and apply adhesives to both the top and bottom flaps of the cartons with the goods already packed therein. They then fold the flaps into closed position and pass the sealed containers through a compression unit, where the glue sets. Speeds of 200—1200 cases per hour are practical on such automatic equipment. Machines may be equipped to seal and glue top flaps only, as in the case of shipping containers for bottled goods which have previously been used to carry the bottles from the glass plant to the packaging plant.

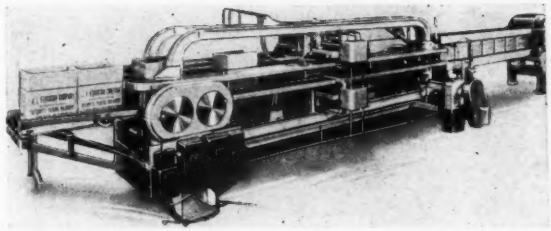
The machines are completely automatic, require no operators and are adjusted to start in motion whenever a case is presented to the machine by the conveyor line. Many machines are equipped with photo-electric cell devices to prevent jamming of cases.



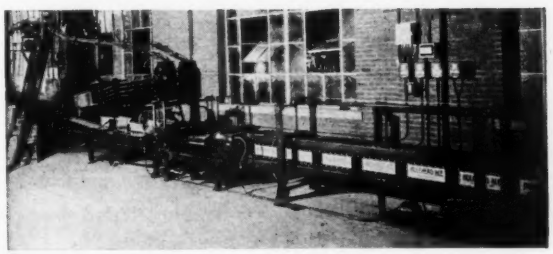
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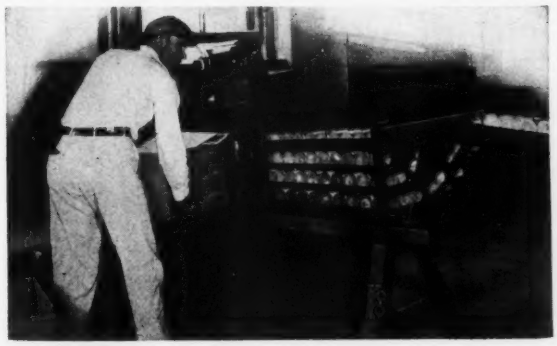


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1—Automatic top and bottom case gluer equipped with a compression unit. Photo, J. L. Ferguson Co. 2—A case loader for beer bottles. The conveyor delivers bottles to grid which positions them. Photo, Standard-Knapp Corp. 3—Automatic top and bottom case sealer. Photo, J. L. Ferguson Co. 4—Packer and sealer for cases of beer cans. Photo, Standard-Knapp Corp. 5—Equipment for loading cans in cases. Proper number of cans is fed horizontally into case. Photo, Burt Machine Co.

Wire-stitching machinery

By John H. Bliss

Wire stitching is a rapid method of assembling and sealing containers, is easy to apply, and produces a seal which is positive, clean and not affected by humidity. The process is inexpensive from the standpoint of both labor and materials. Average size machine-made staples cost 1½¢—6¢ per 1000.

The popular models are known as box stitchers (with horizontal clinching arm), bottom stitchers (with vertical clinching posts), regular slotted-container stitchers (with special anvils and tables). It is around these three types that other models are constructed: the top stitchers, combination stitchers, bag stitchers, corner stitchers, etc.

There are also two other styles called multiple-head stitchers (with from two to ten or more stitcher heads) and automatic regular slotted-container stitchers.

Stitcher heads are supplied by most firms driving stitches at right angles to the frame of the machines. They are also available for driving stitches at 45° and in some instances at 90°.

Throat lengths of machines are 4—50 in. or more depending on the job to be handled.

Many different sizes of stitching wire may be used from which the machine produces wire stitches. The following table gives the popular sizes, the number of feet per pound, the number of staples in a 5- and 10-lb. coil. The wire stitch used in packaging is made from a wire draw 1—1½ in. long.

Size of wire	*Feet per lb.*	*5-lb. coil Number of staples*		*10-lb. coil Number of staples*	
		1 in.	*1½ in.*	*1 in.*	*1½ in.*
.103 × .017	178	10,680	7,120	21,360	14,240
.103 × .020	146	8,760	5,840	17,520	11,680
.103 × .023	124	7,440	4,960	14,880	9,920
.060 × .024	238	14,280	9,520	28,560	19,040
.060 × .020	277	16,620	11,080	33,240	22,160

Standard stitching wire is a low carbon steel rod, drawn, rolled and in some processes slit into established sizes. The surface is finished with a coppered, galvanized or tin coating to resist corrosion. Some concerns are offering wire with an enamel coating in various standard colors. Stitching wires have been made of stainless steel, aluminum, bronze and brass where special conditions warrant the extra cost. The total annual tonnage is estimated at about 350—400 carloads.

Stitching regular slotted containers

A most important development is now in full swing whereby the joints of containers are stitched with semi-automatic stitchers with rubber roll feeds. Within the last two years, elevating machines have been perfected which keep the pile of box blanks at constant levels with the result that old production records were put on the shelf. The machine operator of this combination elevator and stitcher unit folds container blanks and inserts them over the anvil against an electric solenoid switch where the stitcher drives and automatically spaces the staples at the rate of 325 per minute. Where one operator would turn out an average of 2000—3500 staples hourly during the last war, the latest equipment with one operator will produce 6500—10,000 in the same period. All solid-fibre boxes are wire stitched at the joints, and a large percentage of corrugated containers are fastened by this method.

Wire-stitching machinery is doing a very important job in riveting the joints of the V-1, V-2 and V-3 shipping boxes. Some of these containers are fitted with sleeves, and they too are stitched at the joint. These boxes must stand up under immersion in water for 24—48 hours. Many tests were conducted in ocean surfs.

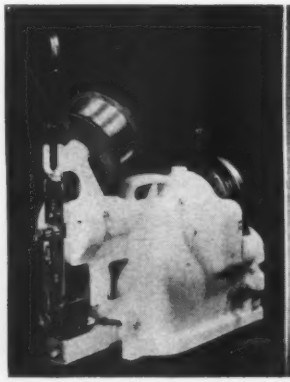
Double-wall corrugated boxes are being stitched at the joints in greater numbers. Stitcher heads which draw wire and produce longer leg staples for handling this thick material are available.

1—Semi-automatic stitching machine with elevator device. 2—Compact wire-stitching machine for counter use, wired with extension cord for foot control. 3—Telescope type of shipping container, stitched at ends and side by a machine handling a wide range of sizes. Photos, Dexter Folder Co.

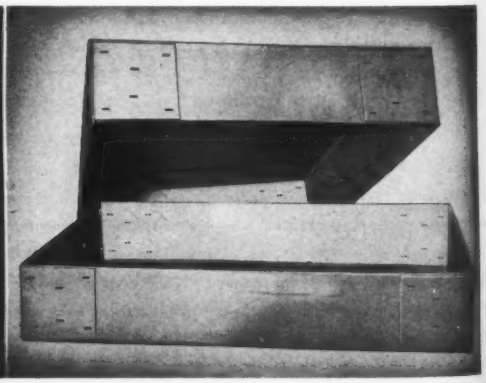
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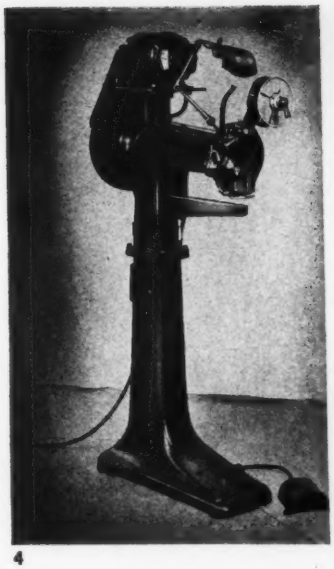


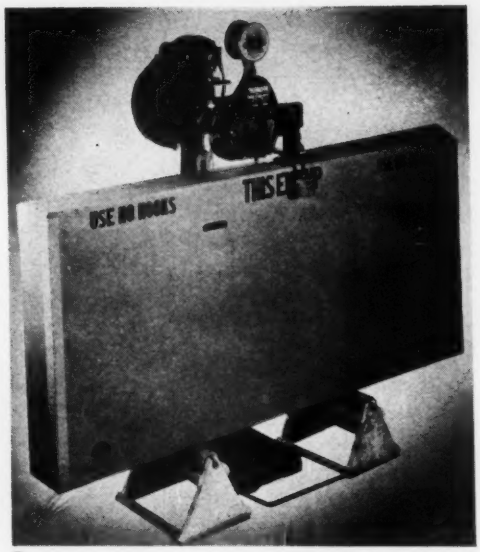
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4—*A heavy-duty Bliss box-stitching machine equipped with a horizontal clinching arm. Photo, Dexter Folder Co.* 5—*Machine for stitching of large and irregularly shaped shipping containers, easily adapted for different sizes. Convenient "jig" permits movement of container to facilitate the stitcher action. Photo, Morrison Division, Harris-Seybold-Potter Co.*

4 5

Fibre drums

War limitations on steel drums, metal containers and veneer drums, plus the scarcity of wood for barrels, have resulted in the mushroom growth of the fibre-drum industry. The WPB estimates the production has jumped 500 per cent in the short period of 18 months. Here again, with certain designs, the sturdy metal staple was needed for an assembly job where a dependable service was required. Combinations of materials such as wood and fibre, thin steel and fibre are being stitched together for this container. Dry chemicals, cheese, frozen eggs, asphalt, greases, garbage and ash containers and many other items are moving in this new container.

Shippers

The shipper packs his wares in the most economical container available from the standpoint of service rendered, customer acceptance and competitive conditions. He can choose one of four methods and materials for sealing the bottoms and tops of one-piece shipping boxes. The wire-stitching method for securing the bottoms of these boxes has enjoyed a remarkable growth because the modern bottom stitcher driving one or two stitches per stroke requires the minimum skill and no adjustment for sizes within a large range. Staples made from a coil of wire are inexpensive—machines are moderate in price. Production is high, in fact this method is considered the most efficient known for sealing bottoms of boxes prior to filling with contents. Bottom-stitched boxes stand up under refrigeration and severe handling conditions.

Top stitching one- and three-piece boxes is a slower process because the filled box must be moved between the application of staples. It is recommended that top flaps be constructed with a 1-in. overlap in order to obtain the highest efficiency.

Two-piece telescope boxes

Many firms producing flat, heavy or bulky products use two-piece telescope corrugated or fibre boxes. In practically every instance these are assembled by wire stitching at the ends or sides. No adjustment of the machine is required for handling a large range of sizes.

Three-piece boxes

These containers may be assembled on single- or double-head box stitchers, depending on the style and range of sizes. They are widely used in shipment of fresh and smoked meats and other products where the minimum material and maximum strength are required. This type of container is very popular for the shipment of beverages where the box is used 10—15 times. The wire stitch is a particularly suitable seal for containers subjected to moisture, refrigeration or climatic changes.

Wooden containers

Multiple-head wire stitchers with automatic features are doing their part in assembling several styles of wooden boxes. Some types of citrus fruit containers, vegetable crates and hampers, bushel, quart, pint and hand baskets depend upon the metal staple as a means of fastening.

Paper bags

One of the popular methods of sealing small paper bags is with the wire staple. Both single- and multiple-head machines are available for this type work. Some concerns seal paraffin and cellulose bags by the well-known heat treatment and then attach the labels with metal staples. Limited supplies of gasoline for retail store services have brought about an increased demand for shopping bags with two wire-stitched handles.

Re-use program

The Re-use Container Program, sponsored by the WPB, recommends that wire staples be removed and the box returned to the original shipper where it can be re-used. A small hand tool, known as a staple puller, is available for this purpose and some shippers report they are using boxes for 5—10 shipments.



1

1—In this installation, two main-line belts have been employed for straight-line production. The conveyors bring a double line of filled cartons from the packing table, deflect them for closing, convey them back to a single line, and then deflect them for the loading. Photo, Lamson Corp.

Materials-handling equipment

High speed in mass-production is appreciably affected by the conveyor equipment employed. Adequate conveyor equipment is of vital importance in cutting handling time, eliminating waits for materials and in appreciably increasing plant capacity.

Mechanized flow systems

In mechanized materials-handling—as in processing and packaging operations—there is one optimum way for doing every operation and a most effective method of combining operations in a smooth sequence. These call for two distinct but smoothly meshing mechanical systems or, considered in its broadest aspect, of two separate but thoroughly coordinated parts of a single mechanized-handling system.

First—the mechanical means used for moving the goods and for ensuring a continuous, automatic flow of all ingredients, bottles, boxes, and cartons from the receiving dock, on through the plant and out again.

Second—the mechanical means by which the progress of this flow is so directed and supervised that component parts meet at designated times and places, the materials from each feeder line joining those from every other feeder line and moving along as a single flow.

Experience in thousands of plants has proved that one of the best ways to obtain continuous flow movement is by combinations of conveyor lines designed to meet necessary changes in flow direction. Such changes may require horizontal, grade, radius, vertical ascent, vertical descent, two-way, overhead or floor types of conveyors.

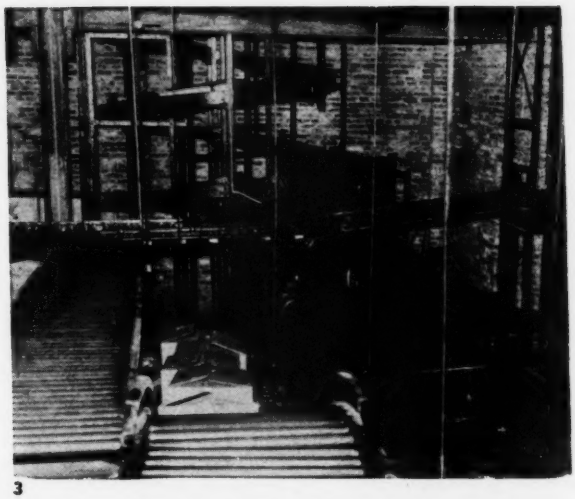
Likewise, experience has proved that one of the most effective methods of coördinating and synchronizing these conveyor lines is by means of pneumatic dispatch tubes with a central terminal in the planning department, manufacturing office or laboratory, and tube stations at various points where one operation blends into another.

These two integrated systems—or parts of a system—not only mesh smoothly and accurately in their own operation, but they provide an effective method for getting practicable standards of "unit-time" performance per man and per machine. They are an effective method for establishing a routine of preparation, operation, and control that will ensure constant maintenance of the conditions under which work standards are set up. And they are effective for working out such mechanisms as routing, order-of-work, controlled conditioning and delivery of materials, tools, containers, and the like.

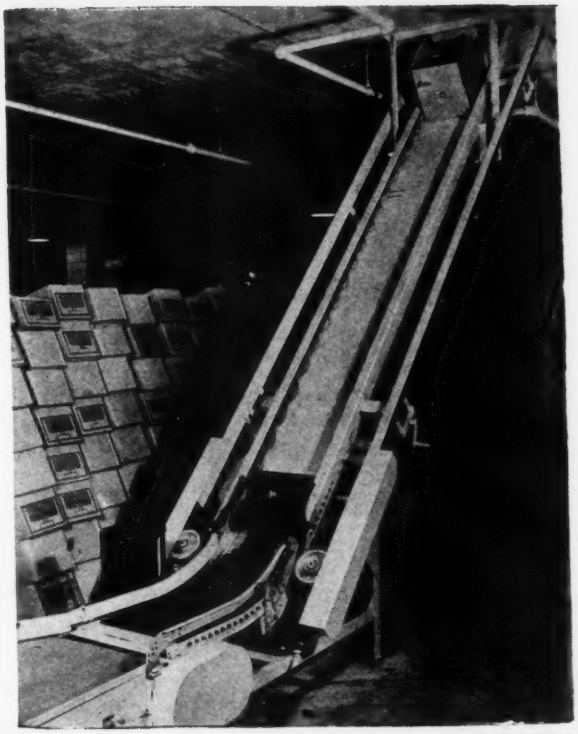
A large wholesale drug company installed a combination gravity roller conveyor and belt conveyor to handle their merchandise, and a pneumatic tube system for dispatching papers throughout the plant. The roller and belt conveyor system increased the volume of this drug plant 50 per cent. The conveyors cost $7800 installed, and the pneumatic tubes $4200. Savings of $18,000 or $20,000 a year are traceable directly to this combination system. A recent addition to their present system, at a



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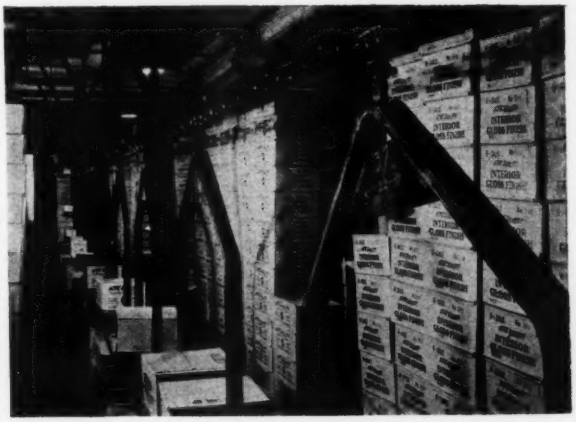


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cost of $15,000, may save double that much the first year.

Naturally the dispatch-tube part of the system is the simplest. It varies only according to the size and shape of the carriers and tubes required to handle the various papers and records. The conveying systems are most complex. They must meet a much wider range of plant and process conditions, but thanks to modern conveyor engineering which has reduced virtually every handling problem into simple components that can be handled by combining standard types of conveyors, little, if any, special designing is necessary.

Types of conveyors

Standard conveyors break down into eight classifications. They are as follows:

Gravity roller conveyors—Using only gravity as motive power, these conveyors consist of a series of free-turning rollers mounted in a rigid frame. The rolls are made in various sizes to accommodate various loads, and they are light enough so that even empty cardboard boxes overcome inertia of roll tube and roller bearings.

Gravity chutes—Made of structural steel and sheet metal, these chutes confine the load and reduce the speed of short travel from an upper to a lower level. Spiral chutes are used for longer drops and in places where space is limited. Some spirals have gravity roller sections, some are operated by power. *(Continued on next page)*

2—Double-deck conveyor. The lower belt takes cases of empty glass from freight cars to storage while the upper belt takes full cases from products room to freight cars or trucks. Photo, Frankfort Distilleries. 3—Gravity roller spiral-lowering cartons while gravity and power-roller conveyors deliver them to packer. Photo, Standard Conveyor Co. 4—A 45° booster has driven rubber roller at bottom for automatic feeding of cartons into squeeze belt. Photo, Lamson Corp. 5—Overhead chain conveyor carries filled cartons to and from storage. Photo, Lamson Corp.



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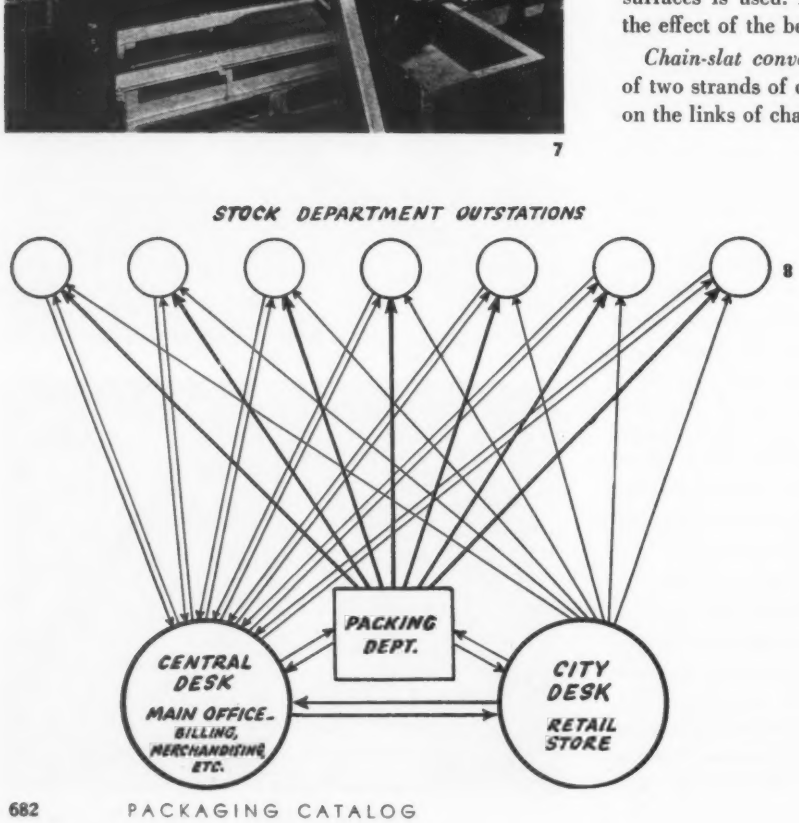
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Live roll conveyors—Similar to the gravity roller conveyor, this type employs mechanical means to power the rolls. Power belts are snubbed against the under side of the rolls under tension supplied by snubbing rolls and sheaves located between the carrying rolls. Flat belts are used for straight travel, and round belts for curving travel. Chain types driving through sprockets on the rolls are also employed. Roller spirals, as mentioned above, can be powered with round-type belts, thus enabling continuous flow down declines of loads of varying weights, with no danger that fragile loads will be crushed between heavy loads. Loads also can be elevated in this manner without necessity of transfer from a horizontal to a vertical conveyor.

Belt conveyors—The belt conveyor is perhaps the best known type of power conveyor. Frequently, rollers are used for the intermediate sections between the end pulleys, but a more modern and usually more economical intermediate is the "slider" type. Ordinarily the bottom and side guards are formed of one piece of metal and the belting slides in this trough. The slider type of intermediate is confined to comparatively light loads weighing not more than 50 lb. per sq. ft., because of the increased friction which results in more serious wear when heavy loads are conveyed.

Booster conveyors—Belts are often installed to convey loads up or down inclines. Cleats may be fastened in the belting, the maximum angle of incline being governed by the stability of the loads. Cleats present a real problem, however, in transferring loads from conveyor to conveyor. To overcome this objection, belting with special non-skid surfaces is used. Angles of incline are then limited by the effect of the belting on the load.

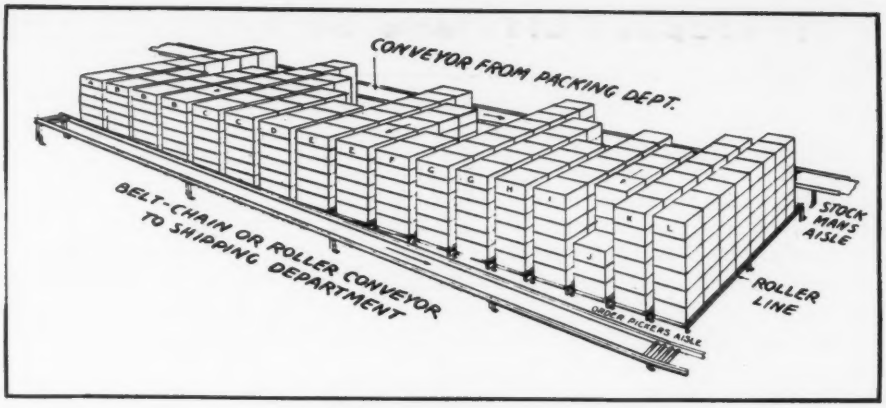
Chain-slat conveyors—This type of conveyor consists of two strands of chain with slats fastened to attachments on the links of chain. It is used in place of belt conveyors



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6—Units of a belt conveyor which may be hooked up at various angles and operate on push-button switch. Cases follow belt without guards. Photo, Island Equipment Corp. 7—Merry-go-round conveyor. Upper conveyor receives cases from a bottling line; lower conveyor takes product from storage to shipping. Photo, Frankfort Distilleries. 8—Pneumatic-tube system facilitates exchange of correspondence, orders, stock requests, etc. Drawing, Lamson Corp.

9



9—This basic principle of stock storage eliminates trucking and handling aisles between piles, increases storage capacity and makes supervision and inventory easy. Drawing, Lamson Corp.

when either the weight or the character of the load would damage the belting.

Overhead chain conveyors—In this type of conveyor the chain is supported from trolleys which operate in or on overhead steel track. Means for attaching the load to the chain are provided and may be in the form of hooks or carriers.

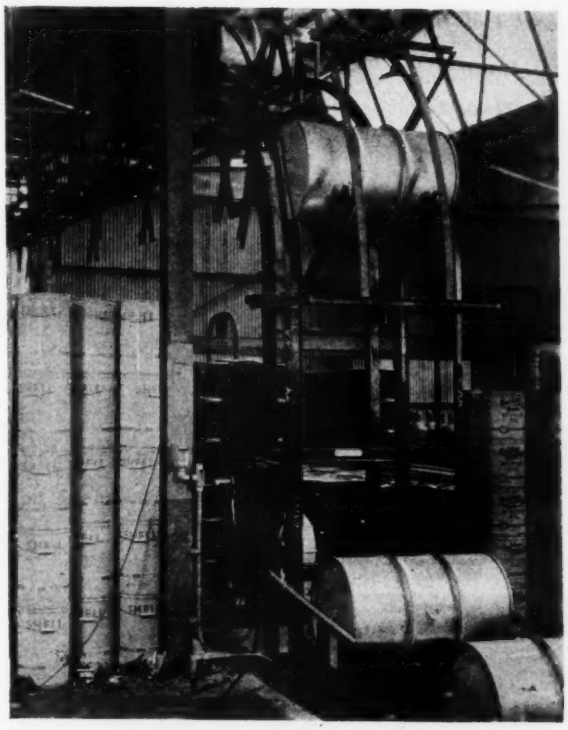
The overhead conveyor dips when necessary to bring the load down to a working height for removal at an operation or for performance of an operation while the load is on the conveyor. By this arrangement it is possible to keep the floor between operations conveniently clear of obstructions.

Vertical conveyors—There are several types of vertical conveyors. The reciprocating type consists of a car suspended by chain or cable over a sprocket or sheave with a counterweight suspended at the other end. The load is usually automatically conveyed to and from the car, while the travel of the car in the shaft is controlled by limit switches.

Continuous vertical chain conveyors consist of one or two strands of chain with cars suspended from the chain. The cars are finger type that comb through corresponding finger type loading and unloading stations to effect automatic loading and unloading. This type of conveyor permits continuous loading at one level and unloading at another level at much higher rates than are possible with the reciprocating type of vertical conveyor. Vertical chain conveyors can also be made to give fully intercommunicating service to several floors. With this type of conveyor, loads at any floor may be dispatched to any other floor.

Conveyor engineers have helped hundreds of manufacturers to make manpower and manhours more productive by planned material handling, by saving time, using plant space effectively, releasing manpower which could be applied to much better advantage in other productive and profitable capacities.

10



11



10—A conveyor of the continuous-chain type which is employed to elevate or to lower filled drums. 11—Portable combination piler for bags, etc. This equipment has a maximum piling height of 1—30 ft. with the carrier frames inclined at an angle of 45°. Photos, Standard Conveyor Co.

Graphic arts equipment

by William Barton Marsh

An extensive range of equipment is available by means of which package wraps, containers or labels may be imprinted and decorated. Machines for these purposes vary from the simple hand-fed press to the intricate web-fed, multicolor, offset or gravure press. Selection of equipment and method of reproduction depend upon the character and requirements of the job at hand. Before a suitable choice can be made the following questions must be given due consideration.

What material is to be printed or decorated?—It makes a great difference whether reproduction is to be accomplished on paper, cardboard, cellophane, metal, or some other of the innumerable substances used in the construction and wrapping of containers. No one printing unit has ever been constructed that will reproduce on all of these different surfaces with equal success.

What is the quantity to be produced?—Length of run of any given label, wrap, or container is highly important in governing selection of equipment. For example, it is impractical to attempt to produce package wraps or containers in production units of a few hundreds or thousands on the same type of equipment that is used to turn out chewing gum wrappers for which production units run into the millions.

What quality of work is required?—The amount the manufacturer can afford to pay for his container may vary from a fraction of a cent to a number of dollars. His choice of wrap or container, of elaborateness of design, of number of colors to be used in decoration, will depend upon this factor of cost as well as upon the kind of merchandise he sells, the market he hopes to reach, the competition he has to face, and so forth. Certainly the packaging of a 5¢ bar of soap will differ in many respects from the packaging of some exotic perfume which sells at $50 an ounce. The printing equipment most suited to the job must be gauged partly by the quality of the work to be done.

What are the characteristics of the container?—The answer to this question may dictate choice of printing equipment. Container characteristics, or requirements, determine container material and consequently govern the types of surfaces presented for decoration. Effects of printing inks, overprint varnishes, etc., and methods of their application on any given surface should be carefully considered and appropriate equipment selected.

The three major printing processes

Because, in this article, it is impractical to describe all the different types of printing equipment that may be used for packaging, discussion will be limited to the major processes currently employed.

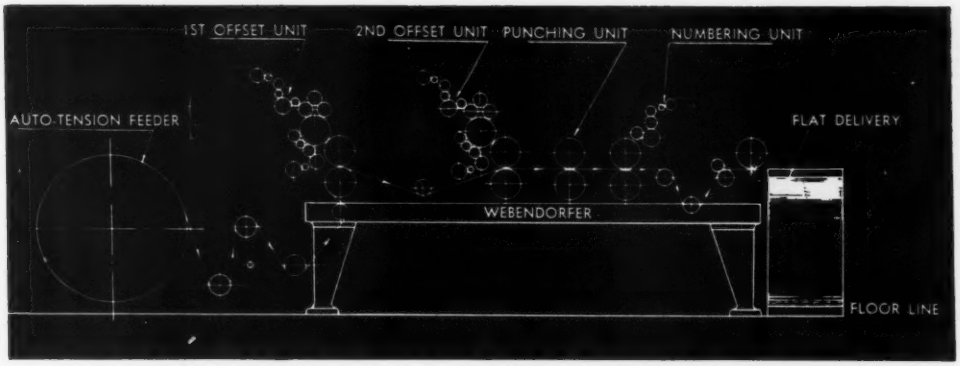
The three major printing processes at present are: (1) letterpress or relief printing, (2) lithography or planographic printing and (3) gravure or intaglio printing. The many variations listed under each of these main headings are mostly in superficial technique rather than the basic processes. Collotype reproduction, for example, differs considerably in technique from lithography, but both are basically planographic processes. All three of these major processes are regularly used in the imprinting and decoration of containers. A correct solution of package decorating problems, therefore, requires some understanding of all of these processes.

1



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1 & 2—*This interchangeable cylinder rotary letterpress machine used for the printing of bread wrappers and waxed wrappers for biscuit boxes, etc. is 72 in. wide. Fig. 2 shows press with the ink distribution in rack-back position for make-ready of a new job. Photo, Kidder Press Co., Inc.*



3—*Diagram of a two-color, high-speed offset press. Drawing, Webendorfer Div., American Type Founders, Inc.*

1. Letterpress or relief printing—This method of reproduction is a fundamental process in graphic arts both because it was the first to be developed and because it is still the process most commonly used. In letterpress printing the image is reproduced by the application of ink to a raised or relief surface. The first medium used for relief printing was probably the woodcut, which was employed to reproduce pictures even before the time of Gutenberg. Today letterpress printing utilizes type or plates or any character cast or engraved in relief on metal, wood, rubber, linoleum, plastic material, or any other substance which will receive and hold picture or character outline.

Letterpress printing has great flexibility, is particularly notable for its sharpness of outline and its ability to reproduce strong, clear color.

2. Lithography or planographic printing—This method of reproduction is called *planographic* printing because in this process the image to be reproduced is on a plane surface, not raised as in letterpress. The process is made possible by the natural, mutually repellent properties of oil and water. In the original process (now known as *direct* lithography) the image is drawn with a greasy medium on a piece of semi-porous stone which is then moistened with water. When ink is subsequently applied to the surface of the stone, it is repelled by the water and adheres only to the greasy outline of the image. This is reproduced by applying paper under pressure to the surface of the stone.

Today direct lithography has been to a very large degree superseded by *offset* lithography. The basic principle of the process is the same, but in the offset method the image to be reproduced is etched by means of light upon a thin metal sheet which has been previously sensitized by a coating of bichromate albumin. After proper treatment, the albumin is washed away except where the image rests. Thus the image itself will accept the ink, whereas the raw metal when dampened with water will repel it. The image is not reproduced by the direct application of the paper to the inked image. The ink is first transferred or "offset" on a rubber blanket from which it is in turn transferred to the paper.

Offset lithography is particularly notable for a softness of tonal values difficult to achieve with letterpress printing. Offset lithography is likewise most valuable for reproduction upon surfaces (coarse-grained paper, cardboard, etc.) which are unsuitable for precise letterpress reproduction.

3. Gravure or intaglio printing—Reproduction by the gravure or intaglio process is in direct contrast to letterpress printing. The image to be reproduced is cut into a thin sheet or cylinder of copper. The ink, which is applied as a very thin liquid, fills up the small interstices of the image—excess ink being removed by means of a "doctor" blade. The image is transferred to the paper by direct pressure, the paper sucking the ink from the recessed dots that form the image.

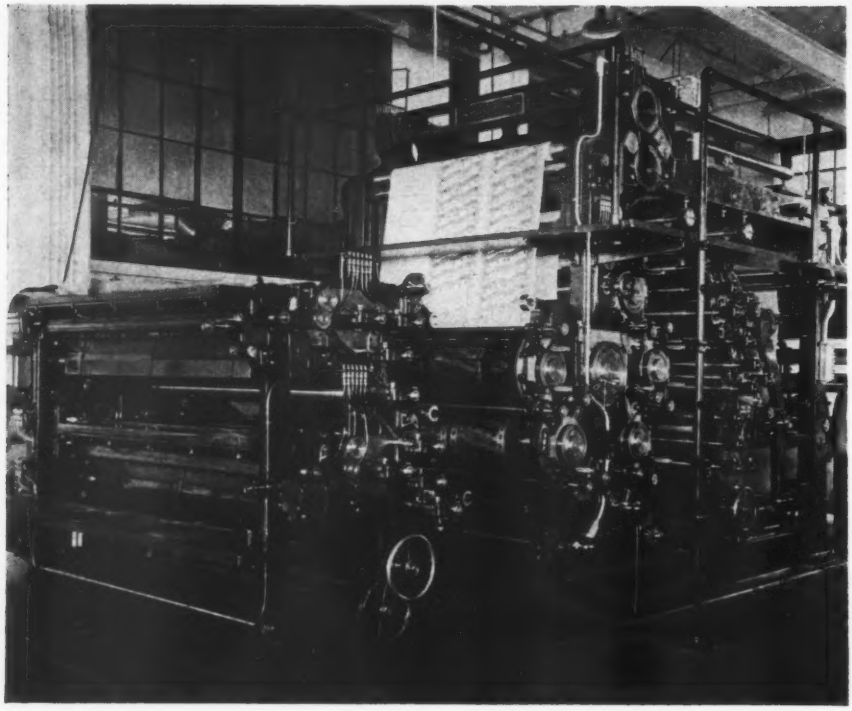
Typical printing equipment

Some idea of the variety of printing equipment being manufactured, may be obtained by referring to the *Printing Year Book and Almanac*. The reference book divides manufacturers of printing presses into nine groups. There are many printing presses constructed for particular purposes which have little or no relation to packaging. The list of possible equipment which may be used for packaging is so long that only a few typical examples of printing equipment can be given here. Types of presses are listed at the left, numbers of manufacturers who make them, at right.

For aniline and other fluid inks	13
For production of continuous forms: fan-fold, multiple billing, sales books, and snap-out	13
Hand-fed and automatic cylinder, die-cutting and creasing, embossing and perfecting small hand presses	32
Sheet-fed rotary gravure	24
Sheet- and web-fed offset, offset perfecting, metal decorating, combination offset and letterpress	17
Proof presses	11
Sheet- and web-fed rotary presses: flat-bed web and others	24
For stamping, die-stamping, and roll-leaf hot stamping	14
For specialties: cartons, milk-bottle caps, tags, tubes, and wrappers	51

Letterpress equipment

Most letterpress equipment, except that used for newspaper and magazine work, is sheet-fed. A great number of different types of presses come within this category, but for commercial job printing the most important are:



4

4—The web-fed method of printing packaging materials by letterpress. This 5-color rotary press is installed at the plant of the Kalamazoo Vegetable Parchment Co. 5—Installation view of a letterpress which uses aniline inks. Photos, Kidder Press Co., Inc.

1. Hand-fed and automatic platen presses (Brandjen & Kluge, Inc., The Chandler and Price Co.)
2. Hand-fed and automatic cylinder presses (American type founders, Inc.; Miehle Printing Press and Manufacturing Co.; Miller Printing Machinery Co.)
3. Sheet-fed rotary presses (C. B. Cottrell and Sons Co., Goss Printing Press Co., Harris-Seybold-Potter Co.)

Important for packages and labels are the multicolor letterpress units (Champlain Corp., the C. B. Cottrell and Sons Co.; the New Era Manufacturing Co.; Webendorfer Division of American Type Founders, Inc.) which will produce two or more colors in one printing operation. Many of these units are roll- instead of sheet-fed.

Offset lithography equipment

A number of different companies manufacture sheet-fed offset presses and these in several sizes. Among those in common use for commercial work are the presses built by the Harris-Seybold-Potter Co., R. Hoe and Company, the Rutherford Machinery Co., and Webendorfer Division of American Type Founders, Inc. Sheet-fed offset presses are also manufactured for the highest type of multicolor offset work.

Web-fed offset presses which operate at a very high production speed are now being used with increasing frequency for both single and multicolor offset work. Much of this equipment is built specially by the manufacturer to meet customer specifications. Among those specializing in this type of equipment are R. Hoe and Company, the New Era Manufacturing Co., and the Webendorfer Division of American Type Founders, Inc.

Decoration on metal for containers is done almost entirely by the offset process. Special offset presses are required for this work because of the character of the material to be handled and of the process itself. Both single- and two-color metal offset presses are available, the more modern types being fully equipped with automatic feeding devices.

Manufacturers specializing in this type equipment include the Apex Products Corp., the Bathrick and Palmer Machine Co., R. Hoe and Company, and the Rutherford Machinery Company.

Gravure equipment

Important development for packaging is the sheet-fed gravure press which may be expected to take an increasingly active part in the production of commercial printing. Manufacturers of this type of equipment include

5



the General Printing Machinery Co., the Harris-Seybold-Potter Co., the Hudson Sharp Machine Co., and the Rotogravure Engineering Company.

Web-fed gravure equipment is most commonly associated with the production of newspaper rotogravure supplements and picture magazines. However, steadily increasing opportunities are arising for the use of gravure equipment in the packaging field because of the ability of these presses to employ highly volatile inks and to apply lacquers and waxes. Many rotary gravure presses, such as those developed by the Champlain Corp., the Meisel Press Manufacturing Co., the C. B. Cottrell and Sons Co., and the John Waldron Co., have been specially built to meet the needs of the packaging industry.

Trends in package production

One of the outstanding trends in the imprinting and decoration of packages and in the production of package wraps and labels is undoubtedly that of steadily increasing speed of production. The number of products that are being distributed in large volume and over wide areas is constantly growing, and with this there is a corresponding growth in the size of production orders of containers and labels. To turn this work out quickly and economically, straight-line production has become not only desirable, but in many instances this method of production has become essential.

Another outstanding trend in packaging is the increasing use of multicolor designs. Competition, as well as the desire of manufacturers for individual identification of their merchandise, has done much to stimulate the demand for more and better color.

For both these reasons, there is a strong tendency for the big packaging jobs to be handled more and more on web-fed printing equipment, whether letterpress, offset, or gravure. The fundamental advantage of web equipment is that with the web of paper or other material under continuous control from feed to delivery, the material can be put through not merely one, but a whole series of manufacturing steps in one operation. Package wraps, for example, can be printed in 2, 3 or 4 colors, numbered, perforated, varnished—even specially imprinted with the distributor's name—then cut to size, and fed directly into the package wrapping equipment without interrupting the steady flow of production. A web-fed machine combines operations.

Since lithography and gravure adapt themselves more readily to a continuous web-fed operation than does letterpress, these processes are finding increasing use in the packaging field, particularly for long runs. Offset lithography has increased its usefulness by the development of the deep-etched offset plate which not only permits longer runs to be made from the same set of plates, but also improves the quality of the work done. Gravure printing has gained much favor because of its ability to deal easily with some of the recently developed fast-drying inks and lacquers.

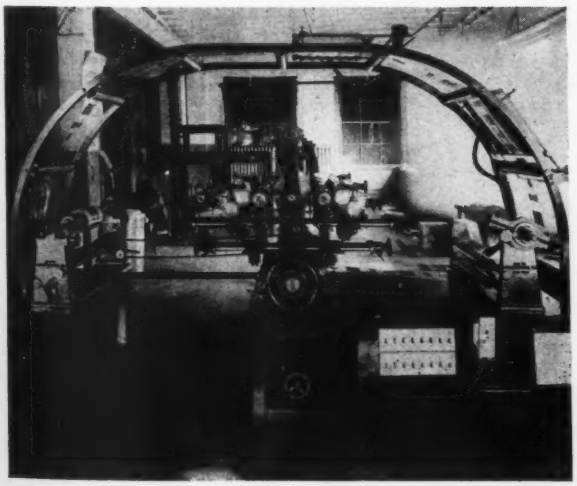
Several of the many interesting phases of package decoration, such as the printing of cellophane and other plastics, the decoration of metal foil, the use of heat embossing and other such devices for the improvement of the appearance of the package or container, are discussed in other sections of this book.

Today many manufacturers who deal in volume production are finding it advantageous to set up their own printing departments to imprint or decorate their containers. In such cases, the equipment used is usually built especially to do a particular job. When a manufacturer is contemplating the setting up of his own production unit, he would do well to consult with a number of equipment manufacturers before deciding upon the equipment to be installed.

Any manufacturer who wishes to have his packages done for him by an independent printer can consult the employing printers' organization in his locality for the names of printers qualified to handle his work on the basis most satisfactory to him. (For further information, see *Methods of Reproducing Designs*, p. 75.)

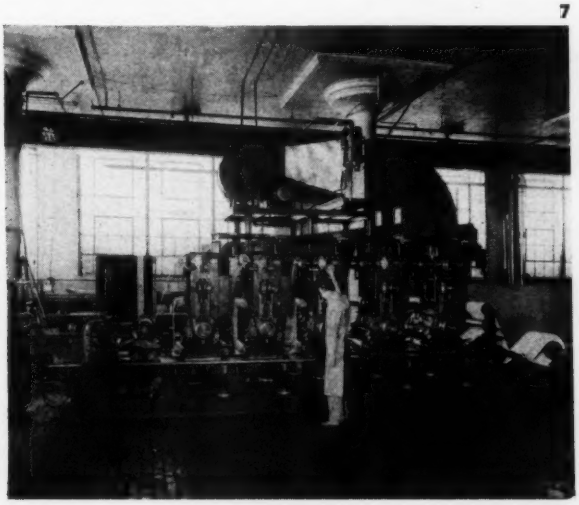
6—Aniline 2-color cellophane press at Rockwood & Co. Prints wrappers for bakery goods, candy, macaroni, etc. Photo, Haida Engineering Co.

6



7—Gravure 5-color press prints, cuts web and delivers sheets on tray in continuous operation. Photo, Champlain Div. The Fred. Goat Co., Inc.

7



Coating and embossing equipment

Coating and embossing are two methods of converting which are used to enhance the appearance or to increase the protective qualities of packaging materials.

Coating machines

Paper may be coated for protection or for decoration. Decorative coating is used on paper which is to be imprinted or which depends upon a high gloss to give it a special finish. Protective coating is a finish which protects the surface of the paper, or if the paper is used for wrapping, protects the contents of a package.

There are various types of coating machines, such as brush, roll, knife, and spray. Selection of machines will be determined by the type of coating desired. Coatings that might show brush marks can be applied better by a roll knife coater. Those with a tendency to rib, i.e., coatings with a high surface tension, can be handled by a roll coater. A spraying machine can be used to advantage on rough surfaces, but tends to dry the coating material during the spraying operation.

The best printed effects are obtainable on clay coating because mineral substances present a fine surface for printing inks. Clay coating may be applied to paper with a brush and then brushed out. As this method is limited in speed, other means of applying clay coatings are used —direct and offset printing, air brush, spraying.

For the protection of food, coatings of lacquer and rubber derivatives are popular, especially if packages are to be heat sealed. The rapid advance made in the manufacture of these coatings has necessitated improvements in coating equipment. Varnishes are also used to coat papers for the protection of foodstuffs. They are applied by either the reverse-roll type of coating machine or a knife coater. The reverse-roll machine will successfully handle coatings with a solid content up to 50 per cent, whereas a knife coater can handle a solid content of 70—75 per cent.

Embossing machines

Paper or board may be made more attractive by embossing, which adds depth and tone to a printed surface. This treatment tends to soften paper and is occasionally used to break paper that is likely to curl from any cause. However, such treatment is not recommended where strength is required.

For the embossing of paper or board, a hydraulic machine offers many advantages. Since the rollers are mounted in sub-frames, they can be quickly removed. Thus it is possible for an operator to use only one frame with several sets of rolls.

Most designs can be embossed without difficulty. Some designs offer a problem because the varying depth of the engraving makes the winding operation difficult. Hydraulic embossing units produce a uniform pressure across the face of the roller and turn out a uniformly embossed web.

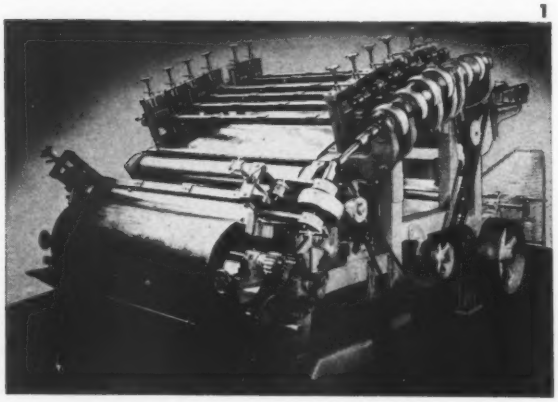
An unusually interesting combination is *print embossing* in which the ink is laid on the embossing pattern of the engraved roll and transferred to the surface of the paper as the embossing is pressed into it.

Inking attachments can be mounted on the embossing machine. The ink is either laid in low spots of the embossing, kissed on the high spots (for shadow effects), or applied in varying combinations of the two. Ink-embossed effects in multicolors are used to advantage on stocks for labels, catalogs, or covers.

Another method of embossing is that of running an engraved roller in contact with a paper roller without gears. The paper roller is moved from side to side in the machine to iron the surface of it. Thus a flat-back embossed effect is obtained. The paper stock is embossed only slightly, but it is attractive for art work, stationery, greeting cards and favors. Boring the steel-engraved roll is an aid in successfully accentuating good effects in sharp relief.

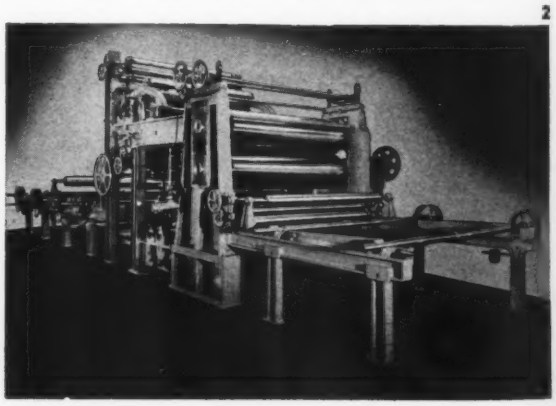
1—*A 7-brush arch bed coater designed for the application of easily printed clay coatings to packaging materials. Photo, John Waldron Corp.*

1



2—*Lacquer-coated materials are employed for protecting food products. This knife coater applies high-solid lacquers. Photo, John Waldron Corp.*

2



Laminating equipment and methods

by Oscar De Sylva

In the field of laminations, two-ply structures predominate. Not only are they economical and comparatively easy to manufacture, but the protective and decorative requirements of the greater portion of the products to be packaged are satisfied by a pair of webs suitably bonded together. In these are found combinations of film to film, film to paper or board, film to metal foil, film to cloth, paper or board to paper, paper to foil, paper to cloth, cloth to foil, etc.

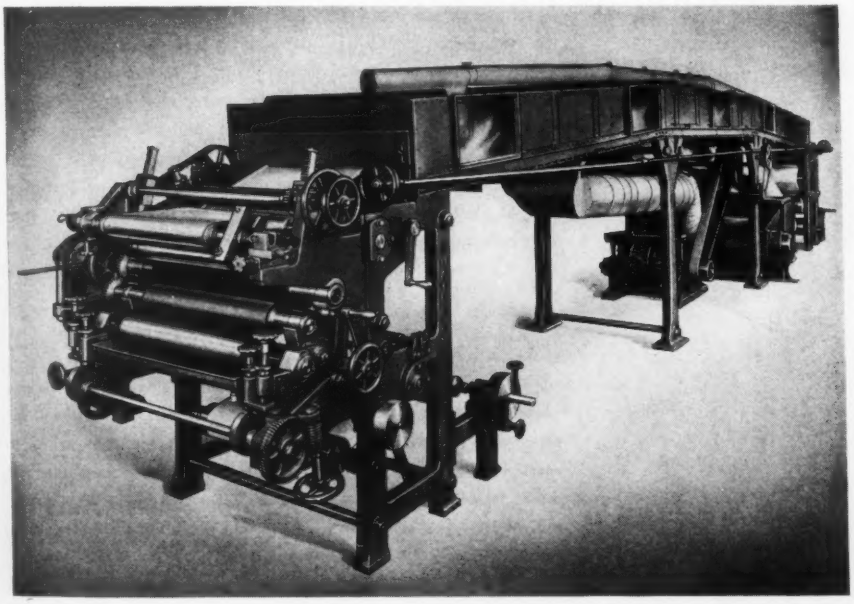
Three-ply structures are occasionally met with, for example, three-ply glassines, or two glassines and film, or film, paper and foil. Laminations containing a greater number of plies are infrequent because (1) no particular advantage is usually gained thereby, (2) economic factors enter into play, (3) as the number of plies increases rigidity and poor working qualities develop, (4) equipment and adhesive limitations become pronounced, and (5) dimensional stability decreases particularly when dissimilar materials are combined.

Since economic factors and manufacturing limitations regulate the weight, size (width) and gauge of cellulosic and synthetic resin membranes, it is found that equipment and methods must be adjusted to handle adequately these types of materials. Regenerated cellulose, because of its sensitiveness to moisture and its adaptability to fluctuations in the water content of the neighboring element, presents problems of combining that are peculiar to this type of material. Because of its sensitivity to water and the resultant dimensional changes that develop, this sheeting cannot readily be bonded to dissimilar materials to provide a permanently stable structure. Therefore a careful choice must be made with regard to (1) the other ply, (2) the type of laminant and the method, and (3) the type of machine to produce the lamination.

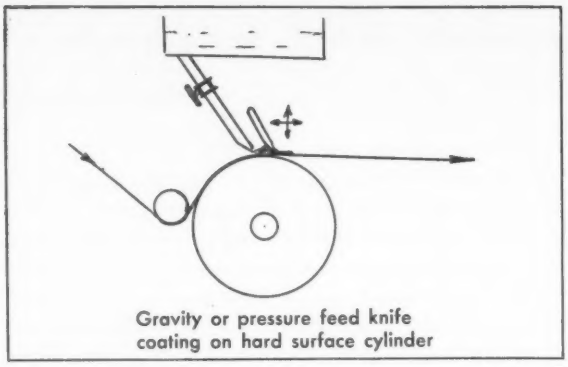
Films made from cellulose derivatives such as cellulose acetate, cellulose acetoproprionate and butyrate are relatively insensitive to water vapor and thereby possess greater dimensional stability. Aside from this consideration, they possess enough rigidity and heat resistance to permit a large number of combinations of plies with similar or dissimilar elements that result in satisfactorily stable combinations. These types of sheetings, however, do not lend themselves well to combining with hot melt type adhesives because of their sensitive thermoplastic properties. Coated regenerated cellulose films fare better in this respect, and many interesting applications have resulted therefrom.

Other resinous films, such as vinyl chloride-acetate copolymer, vinyl chloride and combinations of these with other synthetics (rubber polymers, etc.), are difficult to handle because they possess high values of extensibility. Combinations of these materials with similar or dissimilar plies can be produced satisfactorily if precautions are taken to provide the correct laminant and method. None of these resinous films, excluding cellulose esters, can be subjected to excessive temperatures in the laminating process without producing marked and troublesome dimensional changes. Other elements peculiar to the method and equipment which serve to enhance or moderate these effects, must be considered.

Cellulose materials—paper, paperboard and cloth—present fewer problems because of the favorable characteristics of these materials for lamination. High tensile strength, low distensibility and dimensional stability to

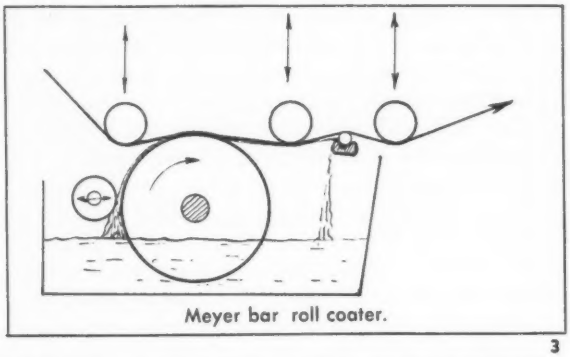


1—This machine is of exceptionally heavy construction, ensuring vibration-free operation. It will laminate materials up to 28 in. in width. Also used for production of gummed paper. Photo, Haida Engineering Co.



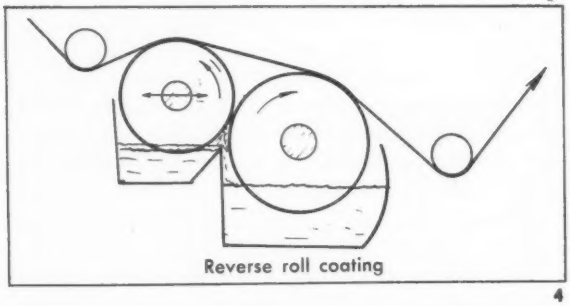
Gravity or pressure feed knife coating on hard surface cylinder

2



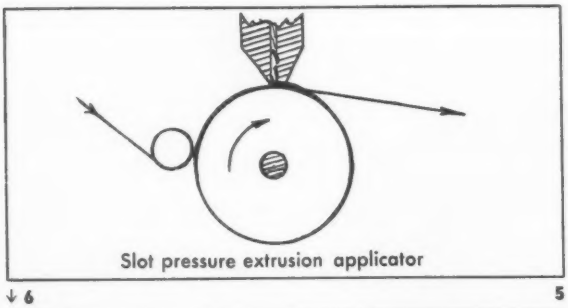
Meyer bar roll coater.

3



Reverse roll coating

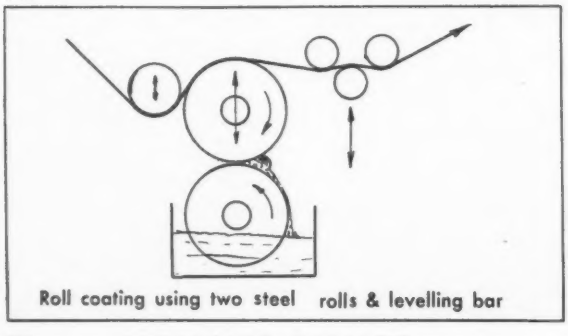
4



Slot pressure extrusion applicator

↓6

5



Roll coating using two steel rolls & levelling bar

relatively high temperatures, are attributes which make these stocks useful and comparatively easy to handle on laminating equipment.

These characteristics, plus the insensitive nature of the materials to organic solvents, permit a wider choice of laminants and greater flexibility in the methods and equipment useful for combining to other plies. Cloth, of course, presents problems that in some instances are not easily surmounted.

The importance of the laminant cannot be underestimated, for it is readily observed that the success or failure of the structure is entirely dependent upon this element. Present-day adhesives are designed specifically for one type or group of laminations. Consideration is not only given to the bonding power of an adhesive for any given pair of plies but also to its contribution towards the stability, durability and functional values of the finished product. Furthermore, the laminant must be modified to conform to the peculiarities of the method and equipment which is used.

Laminants are broadly classified into two groups—solvent types for cold application and hot melts. The latter can be further differentiated at this point into wax and non-wax type resinous thermoplastics. In the solvent group, we find adhesives which effect the lamination by (1) fusion through the action of active solvents—the solvents affecting one or both of the plies; (2) adhesive solids deposition which, though tack free when dry, will properly bond together similar or dissimilar plies under suitable heat and pressure; (3) deposition of adhesive solids possessing high adhesive and cohesive properties which, when solvent-free, expose a tacky surface (the bonding of two or more plies is produced simply by pressing the two surfaces together); (4) deposition of adhesive solids from emulsions or suspensions wherein combining is effected before the liquid phase (commonly water) has been completely eliminated either through evaporation, absorption, or both.

Hot melt laminants, designed for high adhesive strength, must be heated beyond their melting points to a temperature which will provide enough fluidity for ease of application. Combining is effected by bringing the two plies together under suitable pressure and heat. The governing factors for methods, therefore, are (1) ply characteristics and, more important, (2) the properties of the laminant used. The fundamental requirement of laminating is that two or more plies are brought together into intimate contact and held in that state by a bonding agent or adhesive. Combining is effected by pressure, pressure

Numerous schemes have been devised to apply the laminant to one or more of the plies to be combined. 2—Doctor-knife methods for high viscosity coatings. 3—Meyer bar is widely used for hot and cold applications. 4—Accurately-made, smooth rolls apply light or heavy coatings uniformly. Changing horizontal position of upper (movable) roll results in metering action. 5—Method successfully used with lacquer and resinous type adhesives in applications to cellophane, acetate film and paper stocks. 6—High viscosity adhesives in the heavier range of applications function satisfactorily if the metering is well controlled.

and heat, and heat, and this only after the application of adhesive has been made to one or more of the surfaces to be combined.

In these cases, the plies involved must be maintained in a constant state of tension; otherwise, a discontinuous state will result in the lamination. Although this discussion has been focused on continuous web laminations, many of the foregoing features and controlling elements apply to sheet laminations.

Pressure combining dictates that the laminant must be in a tacky, adhesive state at the point of combining and that the pressure be great enough to bring the plies together into intimate union, completely eliminating air and voids between the plies. In heat combining, the adhesive is brought to a plastic state before combining. Pressure, though present, is not the controlling element.

To present a clearer picture of the processes used for combining, it is necessary to consider all the mechanical elements that come into play: first, and highly important, is the application of the adhesive to one or more of the surfaces to be combined; second, the drying system for removal of the solvents, if solvent type laminants are used; and last, the combining unit. To this we must add the other mechanical features which are indispensable, namely, unwind and rewind mill roll stands and mechanisms and tension control units. Equipment designed for the use of hot melts differs principally in that the drying system is not present. The control over the heat to melt and apply the laminant becomes paramount.

The value and efficiency of laminating equipment depends entirely on the following characteristics:

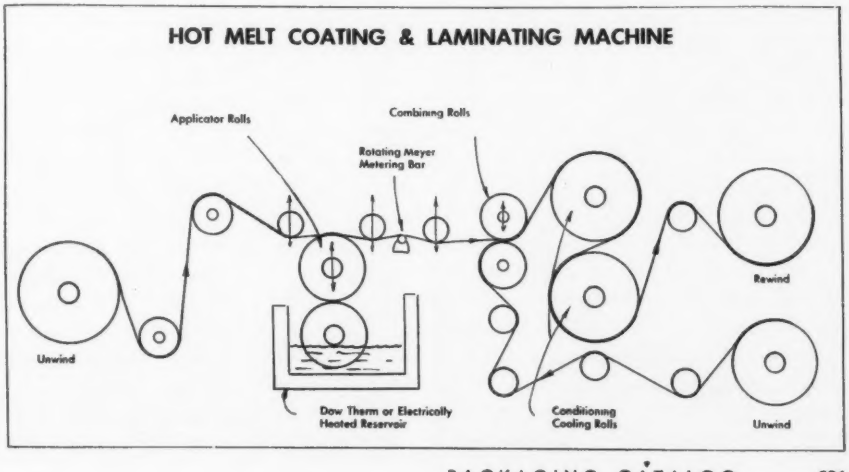
1. *Adaptability of the machine*—Can it handle adequately films, papers and foils in the available sizes, weights, gauges, and quality?
2. *Accuracy of the adhesive application*—Can it be accurately applied and controlled to fall within specification limits in uniformity, continuity and amount?
3. *Drying or solvent removal*—Is the equipment capable of evaporating the adhesive solvents at a rate rapid enough to provide economy of operation and without effect upon the continuity of the adhesive application?
4. *Web travel support*—Are the rolls rigid enough and in true alignment to withstand maximum web tensions without deviations?
5. *Combining rolls*—Can they be subjected to the pressure requirements without distortion taking place?
6. *Ply cooling facilities*—Is the cooling system adequate to permit top machine speeds?
7. *Temperature Control*—Are the reservoirs, fountains, applicator rolls, drying ovens, cooling and combining rolls equipped to provide satisfactory control over each?
8. *Humidification*—Is the system equipped to control the moisture content of the stocks being processed?

The most important and critical part of a laminating machine is the applicating unit. The main differences between laminating machines usually center about this member. As has already been pointed out, a satisfactory laminated product results only after a satisfactory adhesive application has been made. Numerous schemes have been devised to apply the laminant to one or more of the plies to be combined. The following illustrations point out the most popular schemes used today (Figs. 2—7).

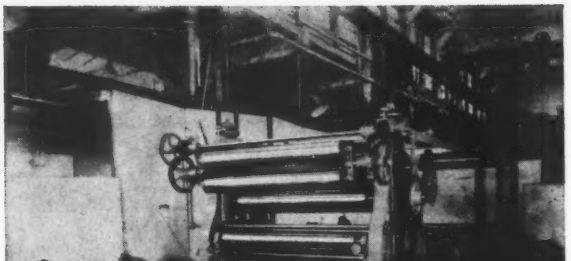
Doctor-knife methods of adhesive deposition (see Fig. 2) are particularly useful for high-viscosity coatings where the weight of laminant being applied is not below 5 lbs. per ream. Irregularities in caliper of the base sheet mirror a corresponding irregularity in the adhesive application. Paper stocks in the heavier weights will vary as much as ¾ of a thousandth from one side to the other. This means that at some point the adhesive deposit is extremely light and consequently the resultant lamination is unsatisfactory. On stocks which are of uniform gauge and which are insensitive to the components of the adhesive, this method of application provides continuity and uniformity of film not easily duplicated or excelled by other methods. Besides this, it permits higher solids applications which provide economies in solvents and increase production.

Roll coating by the Meyer bar (Fig. 3) is a popular and widely used method for hot and cold applications. The principal feature of this scheme is that an excess of material is applied by a roll to the web and directly beyond this point it is metered out by a wire wound round which

7



7—In the production of a three-ply structure in one operation, this method is commonly used for both hot and cold adhesive applications. If penetration is undesirable on porous plies, or if the three-ply structure requires different laminants between each pair of plies, this method is not advised.



8

8—View of a modern, heavy-duty, wide-web coating and laminating machine. Speed is 600 feet per minute. Photo, John Waldron Corp.

presses against the web between two adjustable idler rolls. By varying the diameter of the wire, the space between turns changes proportionately so that different volumes of material will pass through. The excess is returned to the fountain.

This method lends itself well to a variety of applications if requirements are not too critical or extreme. Of prime importance in this method is tension control.

Insensitive rigid films run admirably well on this particular scheme or on its modified forms not only for cold, but also for hot melt adhesive applications. One factor of importance is the necessity for changing the wire-wound rod when a change in the amount of material to be deposited is required. The diameter of the wire controls the metering action; therefore, to vary the amount of laminant, it is necessary to change to a rod wound with wire of a diameter which corresponds to the weight of coating desired. This consequently sets forth the prerequisite for a stock of wire-wound rods of different wire diameters for maintenance of flexibility in metering.

In contrast to the above-outlined method, two other schemes have found considerable favor in coating operations. One of these is illustrated in Fig. 4. In both cases, accurately made, smooth rolls are employed. The upper roll of Fig. 4 is movable on a horizontal plane, while the other roll remains in a rigid mounting. By changing the position of the movable roll, a metering action results. Another method is very similar with the exception that only one roll is used for the adhesive application. Both of these schemes are very useful because it is possible to apply very light and heavy coatings in a uniform manner. With control over the viscosity of the laminant, this technique provides a very accurate metering action.

The foremost disadvantages of these two schemes are that the adhesive applied does not transfer in a smooth manner, thereby necessitating some leveling device past the point of application, and that the reverse roll introduces a drag on the film or paper which limits the application to plies that are substantially rigid and insensitive to the components of the laminants.

Aside from this, lightweight applications of high-viscosity materials cannot be effectively made. One method (Fig. 5) can be used also as a revse roll application if the arrangement of rolls and turning direction are reversed. In such a scheme the limitations are identical to those illustrated in Fig. 4. Both of these methods have been very successfully used with lacquer and resinous type adhesives in applications to cellophane, acetate film and paper stocks. Applications to distensible films are highly unsatisfactory, particularly when a lightweight coating deposit is required.

The roll coating method, as illustrated in Fig. 6, is extensively used for adhesive applications. If the unit is designed with good control over the metering or impression roll, very satisfactory applications to a variety of stocks can be made in a limited range of coating weights. Heavy applications of medium to low viscosity adhesives cannot be successfully accomplished by this method. High-viscosity adhesives in the heavier range of applications function satisfactorily. In practically every case, however, it is necessary to level out the coating by some smoothing device as illustrated. Otherwise, the ridge pattern formation resulting from the separation of the web from the coating roll impairs the value of the lamination.

The pressure extrusion method, as illustrated in Fig. 5, is not very widely used at present because of the complicated system required to maintain the method under accurate and flexible control. Nevertheless, such methods possess a high degree of merit in that, by controlling liquid pressure and web speed, continuous, smooth and uniform depositions of adhesives can be accomplished on a variety of stocks. On the other hand, porous structures, such as machine finished paper stocks, would not function well because of excessive penetration caused by the extrusion pressure of the operation. Therefore, we find this procedure more or less limited to non-porous plies possessing slight variations in thicknesses.

In the production of a three-ply structure in one operation, the method illustrated in Fig. 7 is commonly used for both hot and cold adhesive applications. If penetration is undesirable on porous plies, then this method of application is very unsatisfactory because of the web travel through the liquid. Another limitation is that the majority of three-ply structures require different laminants between each pair of plies, a condition impossible to achieve when using this method. Common practice is either to make the lamination a two-step operation or else to provide the laminating machine with two applicators.

All of the above schemes can be somewhat modified so that the coating process can be better adapted to the peculiarities of the plies to be coated. In hot melt adhesive deposition, it is standard practice to provide controlled heat in the applicating roll or rolls so that lower melt temperatures can be maintained. After solvent type adhesives have been applied to one or more of the plies to be combined, it is necessary to remove the solvents, completely, before combining is effected at the draw rolls.

The "know-how" of lamination rests on a thorough knowledge of the materials that come into play and in the detailed design and control of the equipment and process.

Maintenance problems

by John B. Tuttle

All conditions during the war have been subject to change. This rule has held in the packaging field as in others. New items have had to be packaged rapidly and well. Old package types have been adapted to the material limitations war imposed. Frequently, costly equipment had to be set aside—stored wherever it could be placed out of the way—to await return to peacetime production.

With the cessation of war, change will again be the order. The important differences between conversion to war use and peacetime reconversion lies in the fact that in the latter instance time will permit careful study and planning.

A vital part of such plans should be an appreciation of the factors which contribute to the deterioration of packaging machinery both when idle and when in use. Unless adequate protection has been afforded it, intricate modern machinery may suffer more idle than in operation.

In use, packaging machinery is subjected to wear due to friction of moving parts. Adequate lubrication tends to minimize this friction. Machinery is almost invariably subject to corrosion and rust either from the effect of the atmosphere or by the action of the material being processed. When machinery is not in operation, friction is absent. At all times, however, measures must be taken to guard against corrosion.

Through necessity and experience, means have been developed for effectively combating and minimizing friction and corrosion. Proper anti-corrosion and anti-friction treatment of machinery may be accomplished if requirements are understood and if means of application are available.

Almost infinite variation in materials of construction, speed, loads and plant environment make generalizations difficult in suggesting maintenance methods. What follows must necessarily be considered only a general outline of the principles.

Prevention of corrosion and rust

Ever since man has had metal he has had to combat corrosion and rust. The surface of brass and copper dulls quickly, and steel or iron left in the open for only a short time is covered with a deposit of rust or iron oxide. Oxygen and moisture in the atmosphere aid the metal in its attempt to return to the form in which it occurred in nature. If the piece has been machined or polished for a given purpose, this action usually renders it unfit for use. The film of oxide must be removed, requiring effort and frequently resulting in dimensional changes.

Slow as this action may be naturally, many external agents accelerate it: sulfur, acids, alkalis, gases such as hydrogen sulfide and oxygen, and atmospheres containing corrosive salts are some of these agents. Electric current may also assist in accelerating metal corrosion. One or more of these influences may be present wherever packaging machinery is operated, and will exert some effect.

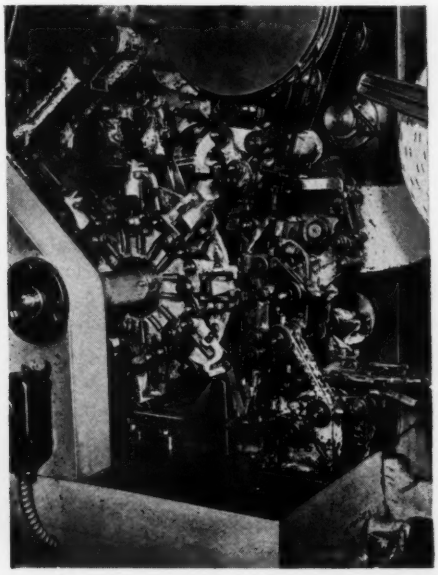
Modern practice has developed three principal methods of combating corrosion listed below.

Use of special metals resistant to corrosive action—These are generally employed in packaging machinery construction and no extensive discussion of these materials is necessary. Drugs, pharmaceuticals, foods and cosmetics are packaged in units which incorporate storage tanks, feed lines, filling spouts and conveyors protected from corrosion by fabrication from non-corrosive materials. Selection is usually the result of consultation and test by

1



2



1 & 2—A tea-bag machine together with a close-up of some of its complicated parts. Such intricate packaging machinery as this presents a bewildering array of lubrication points which are in need of constant attention. By actual count in this machine there are 85 lubrication fittings for oil, 30 for grease. Photo Standard Brands, Inc.

both the purchaser and the fabricator, and must be a part of the plans for any new machine. The suppliers of the metals or the alloys test them to define their fields of utility and can usually promptly state their usefulness with certainty. While still quite expensive, especially in large installations, non-corrosive metals will play an increasingly important role in the future.

Plant environment—The attention given to plant environment in protecting product quality in modern packaging has also aided in preventing equipment corrosion. Packaging is usually apart from the fume-laden atmosphere which so often accompanies processing, and its equipment benefits accordingly. However, the product itself usually reaches some parts of the filling unit, and its tendency to promote corrosion during idle periods and week-end shutdowns is an ever-present menace. A regular systematic plan of equipment cleaning should be repeated as frequently as experience dictates.

Protective coatings—As indicated, corrosion is primarily a surface action. Thus, protective coatings offer the easiest—and usually the least expensive and most effective—method of safeguarding costly packaging equipment. This is especially true of stand-by or stored units which may have to be restored to operation in the shortest possible time. Modern mechanized war compelled us to study these methods critically as it demanded that intricate machines and spare parts be transported long distances and arrive ready for almost instant use. Reconversion will be able to profit by these techniques.

Protective coatings are of two types, the permanent which resists abrasion and can be removed only with difficulty, and the temporary or "slushing" type which can be removed with a suitable solvent and some rubbing. Permanent coatings include plating with a non-corrosive metal or material, paint, lacquer and similar hard-drying compositions.

The plating of parts is well established as a packaging machinery practice and needs no extensive discussion. Choice of the plating material must involve many of the same considerations as the use of the alloyed metals. Thickness of the coating required must be based on the service-life expected and the influences inducing its removal. Careful review of these factors frequently permits a low-cost base material to be plated.

While paint is frequently regarded only as decorative, its primary function is to protect. Here the package machinery operator has his greatest opportunity to insure his equipment against serious corrosion. Somewhere a paint has been developed for almost every known corrosive condition. It is then but a matter of study to select the one best suited to a given set of conditions. A simple review with a paint technician of the surface to be protected, the corrosive influences present and their concentrations, and the durability desired, is usually adequate.

New machinery is usually painted by the fabricator. If the purchaser can so dictate, a quality protective coating should be selected as a part of the design. If not, he should try to learn the nature of the coating used. If it is not suited to his plant conditions, it should be renewed with a more suitable type.

Paint protects only as long as the surface remains unbroken and of adequate thickness. It is subject to the action of certain solvents, abrasion, and heat or cold. Thus, once painted, machine surfaces cannot be forgotten indefinitely. They must be regularly inspected and the paint renewed when wear or chipping and flaking has exposed the metal.

Machined moving parts can seldom be painted. While in operation, they are usually protected from corrosion by the lubricant used to reduce mechanical friction. There remains only the problem of protecting them during storage as spare parts or when the machine is idle. For such use, the petroleum industry has developed several types of non-drying rust preventives which provide excellent protection, may be easily removed.

In consistency, these protective compounds range from free-flowing liquids suitable for spraying to heavy greases which must be heated for application, but which usually give superior protection. They usually consist of a refined petroleum base to which have been added certain ingredients which enhance its ability to prevent corrosion and to neutralize finger stains, etc., unavoidable from handling during fabrication and inspection. Most oil companies publish bulletins explaining the utility of their various grades of rust preventives and providing explicit directions for their application and removal. Also they usually have staff engineers experienced in corrosion prevention.

Preparing packaging units for storage or re-use

If a packaging unit is to remain idle for a time, its storage preparation must be an ordered procedure. Time spent in cleaning and protecting it is amply repaid.

Cleaning—First, it must be thoroughly cleaned. Cleaning operations are preferably performed in some location with more freedom of access than when the machine makes up a part of a production line. Paste reservoirs and similar parts should be completely emptied and cleansed with a suitable solvent or detergent. Rubber-covered rollers, guides and other parts should be removed when possible, cleaned with an appropriate cleaner, and stored under conditions limiting deterioration of their coverings. All metal surfaces should then be cleaned of oil and grease.

A solvent [1] has been developed which is entirely adequate for general machinery cleaning. It has a minimum flash point of 100° F. and has an underwriter's rating of 30—40 with kerosene. It is an effective solvent for oils and greases and, while inflammable, may be used safely if ordinary precautions are observed. It is usually best applied by brushing, the operation being repeated until the surface is free of soil. Spraying may be necessary for intricate mechanisms where force is required to dislodge accumulated, hard-to-reach dirt and grease. It should be attempted only with acceptable spraying equipment and ventilated environment.

Use of corrosion preventives—Following cleaning, the unit should be inspected critically to determine what corrosion preventives should be applied and to what parts.

[1] Stoddard Solvent.

There is usually more time available for painting when the unit is taken out of service than when it is to be placed in service. Also, the surfaces are clean and free from dust which inevitably accumulates during storage.

Painting accomplished, wearing surfaces and machined parts should be coated with a non-drying rust preventive. Choice of the grade will depend on the storage conditions anticipated and the length of the inactive period. Application by brush or swab is preferred since this applies an adequate coating only to the parts requiring protection, minimizing cost and reconversion cleaning. If the coating requires heating, an electric glue pot or some such container permits freedom of movement and constant application temperature.

By nature, the film of a non-drying corrosion preventive is easily subject to abrasion or wiping as it does not harden after application. Thus, parts covered with it must have some added protection to ensure against such disturbance. This is easily achieved by wrapping the parts over their general contour with industrial kraft paper. This covering should be firmly attached by ties or wires, and need cover only protruding parts which would be bumped or touched during the stand-by period. With this preparation completed, the unit is ready for storage, preferably in a dry location, subject to a minimum of corrosive atmosphere and temperature change.

Such a preparation method for storage makes re-use of the unit quite simple. The paper wrappings are removed after the unit has been moved to a location of ready access; machined surfaces are freed of their protective coating by rubbing or brushing with a solvent which is also effective in removing accumulated dust from painted surfaces; adjustment of removed rollers, guides, etc., is easily accomplished; and moving parts oiled or greased.

Lubrication of packaging machinery

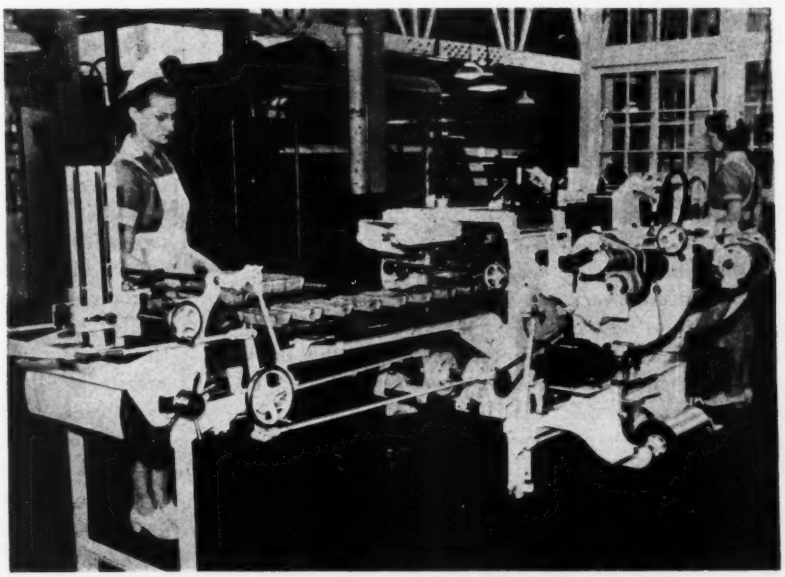
In motion, the machine elements of a packaging unit present literally hundreds of metal-to-metal contacts. These must be separated with a lubricant to minimize wear and to ensure accurate performance. Modern petroleum technology has developed applicable products.

In its simplest terms, the lubrication of packaging machinery is the same as that of other high-speed, complex mechanisms. The correct lubricant must be selected and properly applied at regular intervals. The second part of the problem is largely up to the machine operator, once the selection is made. While many operators are also able to make the selection, it is generally recommended that a lubrication engineer be consulted.

The correct lubricant for the machine—Before selection of a lubricant, consideration must be given to all the factors which affect its performance. These may seem fewer in number than is really the case. For example, in lubricating a given group of packaging machines an engineer may have to consider any or all of the following: the machine element involved (gears, bearings, cams, slides, etc.), the temperature of the moving parts, the load and load variation, the speed and speed variation, operating clearances, whether parts are open or enclosed, atmospheric conditions, importance of leakage, contaminants such as the material being packaged or glue, etc.; and the method which can be used to apply the lubricant. In food-handling equipment there may also be Federal or local regulations covering the quality of the lubricant used. All these factors must be weighed as to relative importance, and the lubricant chosen which, when properly used, will most nearly satisfy all of them.

A lubricant usually performs two functions: it prevents contact of metal surfaces, substituting low internal friction of the lubricant itself for the high friction of the metal; it also serves as a means of dissipating frictional heat by conduction. These two functions dictate in a general way the nature of the lubricant and its physical character. High-speed spindles are best lubricated with a light-bodied oil—the higher the speed, the lighter the oil used. Light-bodied oils have low internal friction and are good heat conductors. Also they flow freely at all temperatures. *(Continued on next page)*

3



3—For the maintenance of automatic wrapping machinery which is employed for food products, special non-injurious lubricants must be used to avoid any possible danger. Photo, Battle Creek Bread Wrapping Machine Co.

Slow-moving elements may require viscous or semi-solid lubricants. Their slow speed causes less frictional heat, and maintenance of a lubricating film is of greater importance. The greater density of the heavier oils enables them to cling to the element surface, preventing damage which might result from metal to metal contact. Also, their cohesive nature limits the amount of the lubricant which will be thrown off, reducing the frequency of application.

Types of lubricants—Petroleum lubricants for packaging machinery are of two general types—oils and greases. Oils vary in viscosity or body density from light spindle oils to heavy cylinder oil used, for example, in enclosed gear drives. Greases are oils of different viscosities which have been rendered solid or semi-solid through the addition of soap or other thickening agents.

The soaps used are usually calcium, sodium or aluminum—each imparting certain special characteristics to the grease prepared with them. Calcium or lime soap greases resist water but are somewhat less stable under high-speed operating conditions than soda soap greases. For this reason, calcium soap greases are usually chosen for bottle-filling or canning machinery where water inevitably reaches the bearing surfaces. Likewise, soda soap greases are usually recommended for high-speed anti-friction bearings or bearings subjected to high operating temperatures caused by radiant heat.

Aluminum soap greases have less water resistance than calcium-base products, but possess high cohesive power. They are usually applied to parts subjected to intermittent or throwing motion where they must adhere firmly to the metal surface. All these grease types are available in different consistencies, and correct selection involves considering both the composition and the physical form.

Lubricating bearings—Most packaging machine bearings are of two types—anti-friction or plain journal bearings. The anti-friction bearings are of the ball or roller type and most frequently are grease-lubricated. They usually operate at fairly high speed, and should require lubrication at infrequent intervals if the grease has been correctly chosen and is not washed from the bearing by water or other contaminants. Most anti-friction bearing manufacturers prefer the soda-type lubricant since it exhibits better stability in service. However, soda-base greases cannot be used in moist or wet conditions, and calcium or aluminum greases must be applied.

The grease is usually applied to the anti-friction bearing with a grease gun of appropriate size which is filled directly from the shipping container of grease. Caution in using the gun should avoid excessive use of grease. Many precision bearings may be harmed as much by excess grease as by too little. If the grease is packed into the bearing under pressure, the friction between the rotating element and the grease may cause overheating and seizure. Many bearings are designed with vents to prevent this, but if they are not evident care should be taken to avoid overlubrication.

Many plain bearings on packaging machines are also lubricated with grease. These include journal bearings which are not easily accessible, bearings which require infrequent lubrication due to slow speed or low load, and elements such as cams, slides, etc., on which a film of oil cannot be maintained easily. The grease is usually applied either by a grease gun or through a screw-down cup. Gun application usually involves applying enough grease to force some out of the ends of the bearings. This tends to flush out any contaminating abrasive present and ensures a complete grease film within bearing. Screw-down cups are filled at regular intervals by removing the cap and filling the recess level full with grease. Bearing lubrication is accomplished by turning the cup down a few turns at each lubricating interval until the grease has been used. Spring-loaded cups are available.

Oils are usually applied to plain bearings by hand can, drip oiler, wick or mechanical-feed system. The drip oiler has a reservoir which feeds oil slowly by gravity while the bearing operates. Wick feed depends on the capillary climb of the oil to replace that wiped from the wick surface in contact with the moving element. Mechanical systems are synchronized with the machine motion and deliver a measured amount of oil at regular intervals. Satisfactory operation of any of these requires systematic examination and, the selection of both oiler and lubricant fitted for a given machine element.

The correct lubricant for the product—Spattering and dripping of the lubricant is a disadvantage on almost all packaging units. The oil may reach the contents of the package, spoiling it; it may damage the appearance of the container and cause excessive lubricant expense. Aware of this, the petroleum technologist has developed the so-called semi-fluid or clinging type oil lubricant. These products are semi-fluid in consistency and contain added elements to improve both their cohesive and adhesive properties. These are of special interest for use on cams and other intermittent motion units which tend to fling the lubricant from their surfaces. They are usually light in color, and they can solve many difficult lubricating problems.

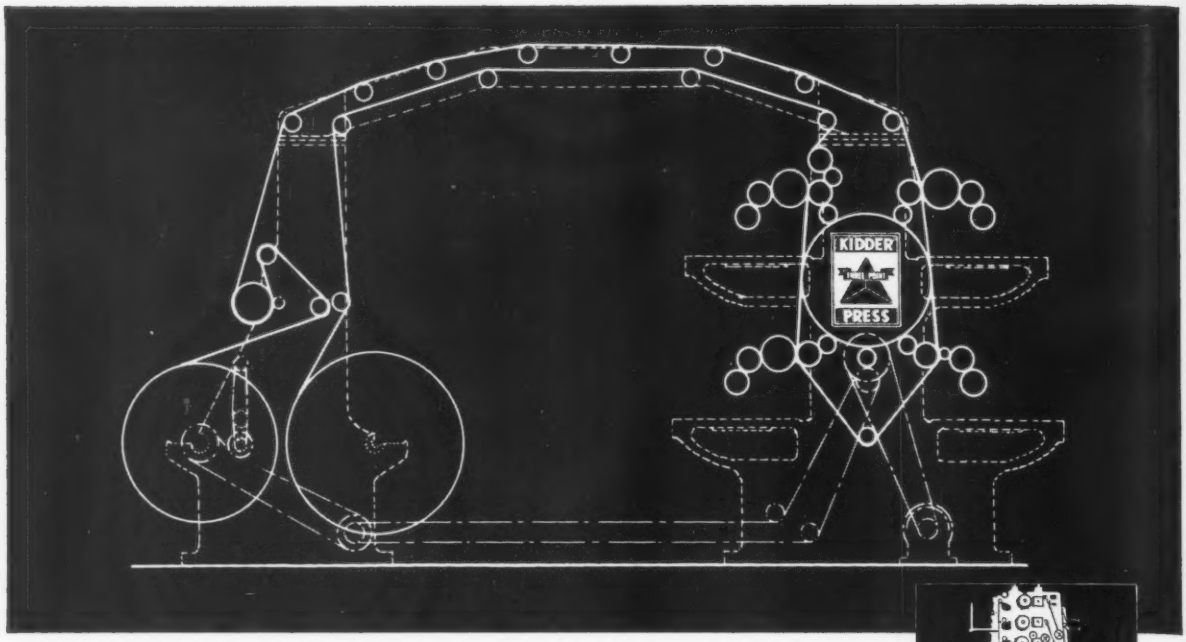
In packaging foodstuffs and such items as cigars, cigarettes and pharmaceuticals, it is usually desirable to use a lubricant which is not deleterious to human health should it inadvertently reach the packaged material. The petroleum industry meets this need with both oils and grease-like materials—U.S.P. in quality.

Storage of lubricants—Having selected the proper lubricant and arranged its systematic correct application, there remains the problem of storage. The petroleum manufacturer realizes that modern light-speed units are frequently machined with a precision formerly accorded only to fine measuring instruments. Maintenance of these surfaces is vital to their operation, and they may be easily spoiled by only slight contamination of the lubricant. He therefore, cleans shipping containers with care, and repeatedly filters each lubricant as it is packed. All this is valueless if the machine operator does not observe equal care in storing and using the material.

Barrels and cans should be stored so that they are easily accessible but as free as possible from contamination. System in lubrication is difficult only until one has become accustomed to it.

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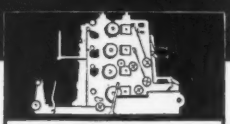
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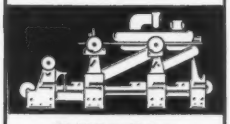
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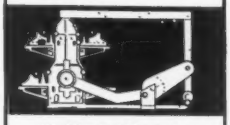
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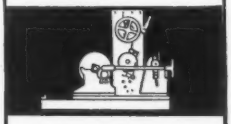
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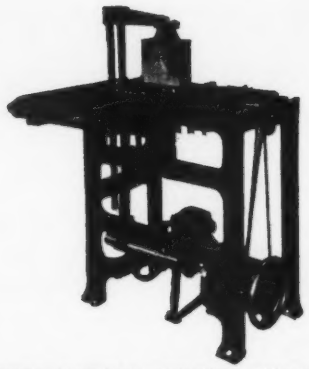
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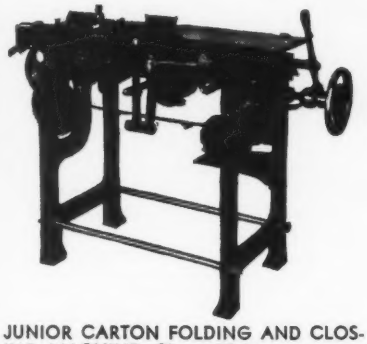


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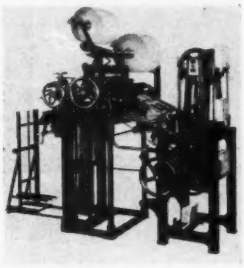
Today more than ever before plant executives are investigating methods of improving the manufacture of their product—seeking ways to maintain or increase profit. This usually includes checking all angles of production and developing faster and better means of increasing plant output.

However, very often these investigations overlook one important item—the carton setup and closing operation. Frequently this is done by hand, even when the output justifies replacement of such hand work by machine. In practically every case machines have resulted in speeding up the entire production program, with a substantial reduction in labor cost as well.

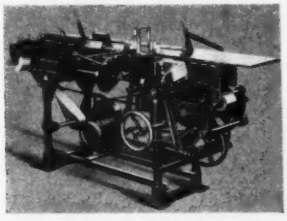
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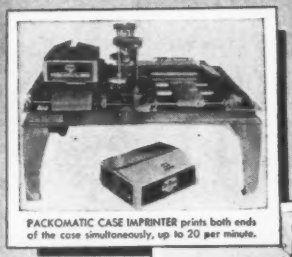


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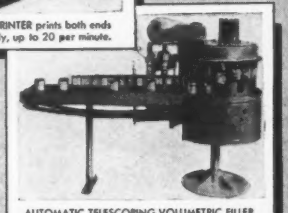
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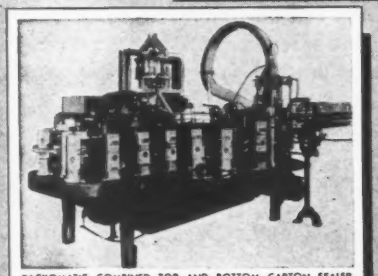
TO HELP YOU SPEED YOUR PRODUCTS ON THEIR WAY....



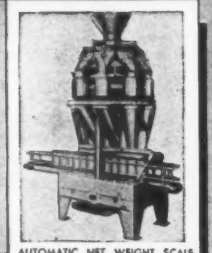
PACKOMATIC CASE IMPRINTER prints both ends of the case simultaneously, up to 20 per minute.



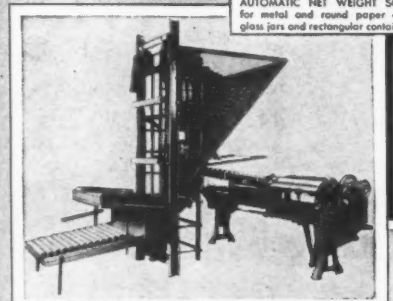
AUTOMATIC TELESCOPING VOLUMETRIC FILLER for handling semi- and free flowing products.



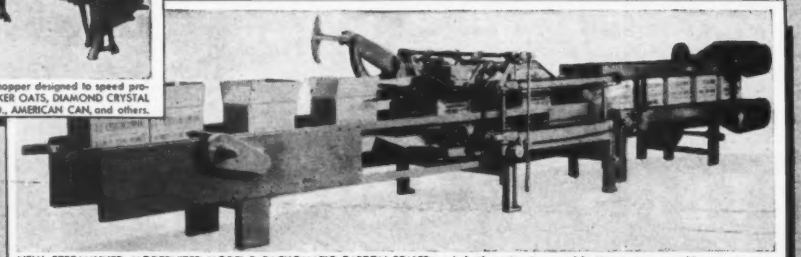
PACKOMATIC COMBINED TOP AND BOTTOM CARTON SEALER with automatic carton feeder and volumetric filler seals both top and bottom flaps automatically. Operating speed, 60 cartons per minute.



AUTOMATIC NET WEIGHT SCALE for metal and round paper cans, glass jars and rectangular containers.



AUTOMATIC TUBE CUTTER with elevator hopper designed to speed production from 70 to 100%. Used by QUAKER OATS, DIAMOND CRYSTAL & LESLIE SALT COMPANIES, SWIFT & CO., AMERICAN CAN, and others.



NEW, STREAMLINED, MODERNIZED MODEL D PACKOMATIC CARTON SEALER seals both carton tops and bottoms on one machine—or tops or bottoms only if desired. Portable or stationary models are available to handle regular corrugated or fibre shipping containers at various speeds.

Experience



There's no substitute for it—that enviable reputation for having served Business and Industry long and well for nearly a quarter century of packaging progress!

This year J. L. Ferguson Company enters its 24th as consultants on handling, filling, weighing, sealing and imprinting of packaged products of practically every size, weight and type . . . Also as builders of dependable PACKOMATIC packaging equipment.

You'll find interesting examples of PACKOMATIC packaging accomplishment pictured on this page . . . You'll get a more comprehensive idea of the scope of our production in the list of typical PACKOMATIC equipment below. You can learn more about PACKOMATIC and any *specific* suggestions or recommendations we may have for your company by contacting us at Joliet—or through one of our factory branch offices. You'll find them conveniently available—from coast to coast *Consult* your classified directory

NOW is not too soon to start your V-Day package planning Orders for future delivery are now being booked—and will be handled in turn

TYPICAL PACKOMATIC EQUIPMENT

Case Imprinters
Case Sealers
Volumetric Fillers
Net Weight Scales
Carton Making Machines
Carton Sealers
Dating (Coding) Devices
Auger Packers
Paper Can Tube Cutters
Paper Can Tube Gluers
Paper Can Shrinkers
Paper Can Cappers
Paper Can Setup Conveyors

For Better Package Handling Tomorrow, Contact PACKOMATIC Today. Representatives listed in Classified Directory.

PACKOMATIC

PACKAGING MACHINERY

J.L. FERGUSON CO. JOLIET, ILL.

NEW YORK . . . CHICAGO . . . BOSTON . . . CLEVELAND . . . DENVER . . . LOS ANGELES
SAN FRANCISCO . . . SEATTLE

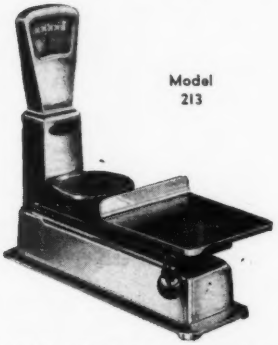
Weighing Equipment for 1945 Modern Packaging...

Model A-244

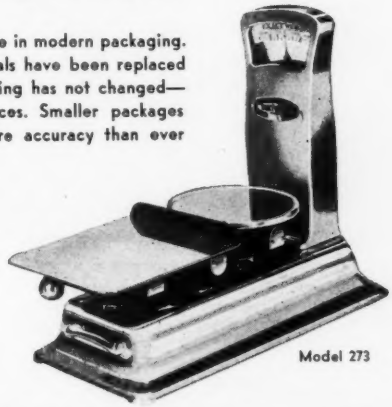


PRODUCTS—Quality pre-determined weight scales for modern packaging; automatic checkweighing, controlling automatics, hand weighing.

Revolutionary changes have taken place in modern packaging. Foils, metals and other critical materials have been replaced by paper, carton and plastics. One thing has not changed—weights are still in pounds and ounces. Smaller packages prevail. What is required now is more accuracy than ever with added speed of operation.



Model 213



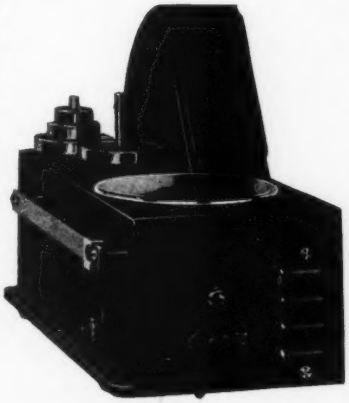
Model 273

SELECTROL

Model A-244 — A completely automatic checkweighing machine for direct insertion in any production line. Features 100% checkweighing of packages at speeds up to 120 units per minute with rejection from the line of all packages failing to meet weight requirements. Inherent stability of electronic interpretation means in combination with micro-movement weighing element allows for uninterrupted service through millions of weighing cycles. Weighing member oscillations damped through electronic circuit. Standard models in capacities from 1 oz. to 1 lb. with visual sensitivities beginning at 1" per gram. Rejection accuracy better than one part in 1000. Available only for operation with power source of 110-120 volts, 50-60 cycle, single phase alternating current.

Model 213—End Tower construction for fast multiple checkweighing operations. Fits any production line—is trouble-free in operation—ideal for present day small packages of dehydrated foods and drugs. Accurate to 1/8 ounce—Capacity to 3 lbs.

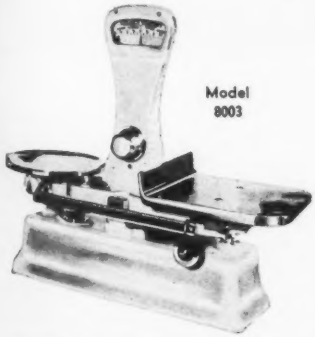
Model 273—End Tower construction completely changes all standards by which modern high speed over and under weight scales are to be judged. Features—Short platter fall which multiplies operating speed and this feature materially reduces scale depreciation—compactness—less space on the bench—fits any production line—uninterrupted straight line production across the scale—heavier construction for added ruggedness. Accurate to 1/8 oz.—Capacity 12 lbs.



Model 1304 — EXACT WEIGHT "Iron Horse" for heavy duty weighing of pre-determined weight packages. Features rugged construction, short platter fall which eliminates much scale wear, long indicator travel on the dial, speed of operation, protected dashpots to eliminate foreign matter, working parts enclosed, weighing accuracy unaffected by out-of-level floors or machinery vibration. Accurate to 1 ounce over and under weight under full load—Capacity to 150 lbs.



Model 1304



Model 8003

Model 8003—The COLUMBUS, a general purpose scale furnished in white enamel or nile blue as preferred. Features center tower construction with indicator travel of one inch to one ounce . . . thereby removing the last excuse for inaccuracy in all checkweighing operations. Accurate to 1/8 oz.—Capacity to 12 lbs.

The SHADOGRAPH is a revolutionary advance in precision weighing. A light ray replaces mechanical indication to allow reduction in working parts thus producing greater accuracy and speed. Noiseless in operation—instantly ready to weigh by plugging into any electrical outlet. Featuring extremely fine sensitivity SHADOGRAPH is dependable and accurate in any high speed modern packaging operation.

INDUSTRIAL PRECISION

Exact Weight Scales

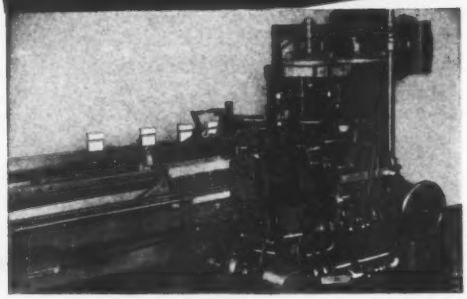
THE EXACT WEIGHT SCALE COMPANY

223 W. Fifth Ave. Columbus 8, Ohio
Dept. I 783 Yonge St. Toronto, Canada

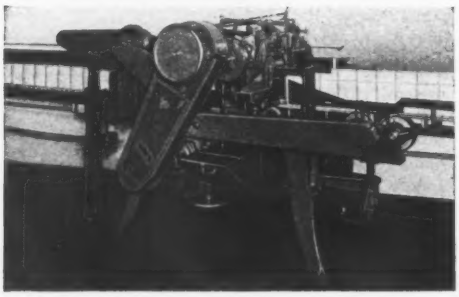
PNEUMATIC

"Start to Finish"
PACKAGING MACHINERY

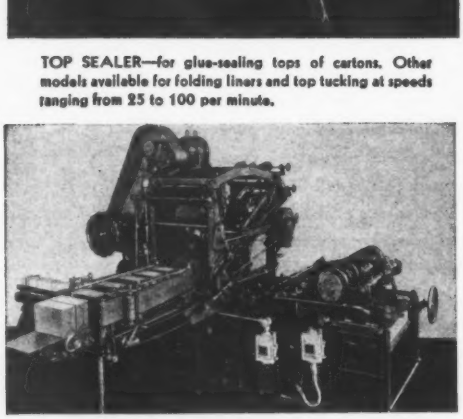
Avoid divided responsibility. Pneumatic offers you the opportunity to install complete co-ordinated packaging hook-ups designed, engineered, built and serviced by one company.



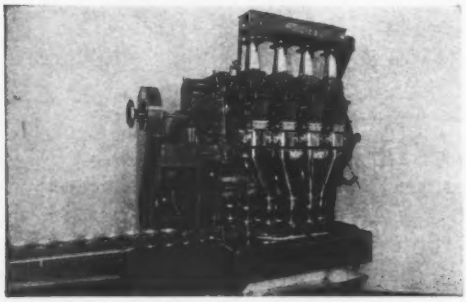
HI-SPEED CARTON FEEDER & BOTTOM SEALER—one of nine different models for feeding, forming and bottom sealing or tucking cartons at speeds ranging from 10 to 105 per minute. All models adjustable for different carton sizes within certain limits.



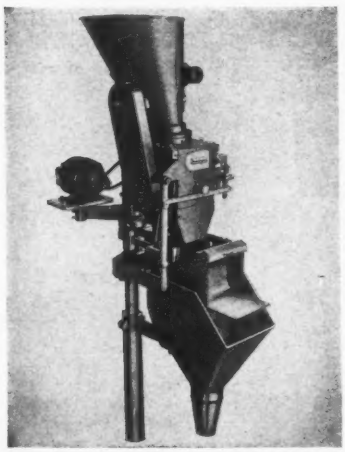
TOP SEALER—for glue-sealing tops of cartons. Other models available for folding liners and top tucking at speeds ranging from 25 to 100 per minute.



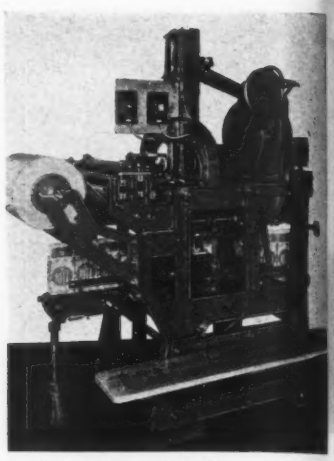
TIGHT WRAPPER—one of four machines for gluing printed tight wrappers to shells. Entire inside surface of wrapper is glued to insure strong sift-proof, insect proof package. Speeds from 40 to 70 per minute are entirely practical.



FOUR SCALE NET WEIGHT COFFEE WEIGHER—one of Pneumatic's 25 different types of gross and net weight weighers for handling free flowing and semi-free flowing materials. Speeds range from 10 to 100 per minute.



SEMI-AUTOMATIC ALL PURPOSE WEIGHER—two models for 2 oz. to 3 lb. loads of peas, beans, all grinds of coffee, rice, etc., in bags, tins or cartons.



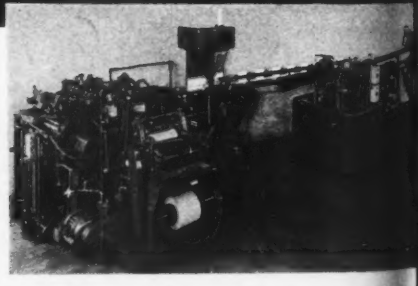
CARTON LINER—cuts glassine, waxed or plain papers from a roll, then forms, seals and inserts the bag.

OVER 80 DIFFERENT AUTOMATIC AND SEMI-AUTOMATIC MACHINE MODELS FOR:

Carton Making	Bottom Sealing	Filling	Tight Wrapping
Feeding	Top Tucking	Weighing	Labeling
Forming	Top Sealing	Packing	Lining Closing
Bottom Tucking	Wax Tight Wrapping		Lining

also:

Bag Flour Packers	Shoe Box Machinery	Can Cappers
Double Package Makers	Can Fillers	Can Labelers
Tea Baggers		Powder Fillers



"LOWER COST PER CONTAINER"

PNEUMATIC

PACKAGING & BOTTLING MACHINERY

DOUBLE PACKAGE MAKER, AUTOMATIC FILLER & ROTARY TOP CLOSURE—a complete 3 machine hook-up for producing a package within a package. Pneumatic's new Double Package consisting of a printed carton with individual inner bag liner offers added insurance for your product against loss of flavor and freshness. An ideal container for dried fruits, pudding powders, gelatin desserts, confectioners sugar, prepared flour, individual servings of cereal, tea, coffee, etc. Send for a sample package today.

PNEUMATIC SCALE CORP., LTD., 77 Newport Ave., North Quincy 71, Mass.

PNEUMATIC "Start to Finish"

BOTTLING MACHINERY for BOTTLES — CANS — JARS

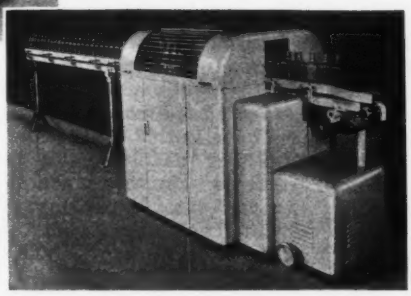
Pneumatic is the one machine builder offering a full line of cleaning, filling, capping and labeling machines designed to operate as individual units or in complete co-ordinated hook-ups.

CLEANING

Pneumatic's Inverted Air Cleaners assure thorough cleaning of new glassware. Containers while inverted are subjected to a blast of clean, dry air which completely removes all foreign matter.



At Left—SEMI-AUTOMATIC INVERTED BOTTLE AIR CLEANER: Attendant holds two containers simultaneously and in one motion inverts them, thrusting the necks in the direction of the self-centering nozzle seal, where the air blast is received. Machine will handle a wide variety of bottle shapes and sizes at speeds ranging from 20 to 50 per minute.

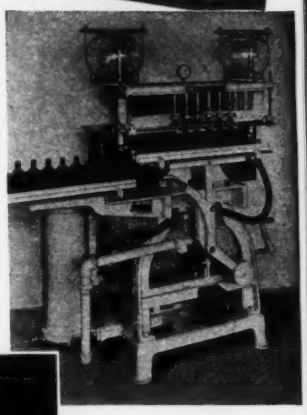


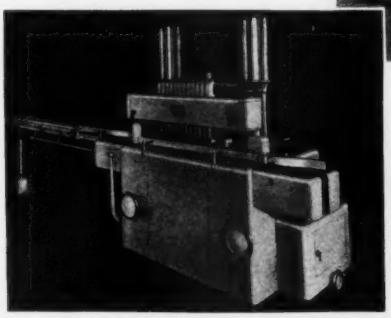
At Right — AUTOMATIC INVERTED BOTTLE AIR CLEANER: A fully automatic machine similar in operating principle to the Semi-automatic Cleaner. Will handle 3 oz. to 32 oz. bottles, jars or jugs at speeds up to 120 per minute.

FILLING

Illustrated are two of Pneumatic's several vacuum filling machine models for accurate filling of bottles, jugs, cans, and jars at speeds ranging from 20 to 120 per minute.

At Right—SAMCO JUNIOR VACUUM FILLER: For free-flowing or semi-free-flowing liquids in 1 oz. to 1 gal. cans, regular finish of AGST glassware. Parts change takes less than 15 minutes, therefore machine is particularly suited for short runs on a variety of products and container sizes at speeds up to 40 per minute.



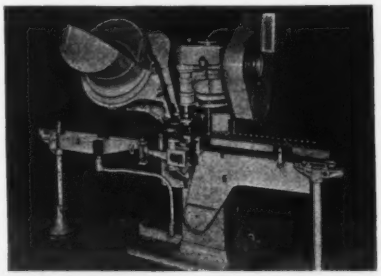


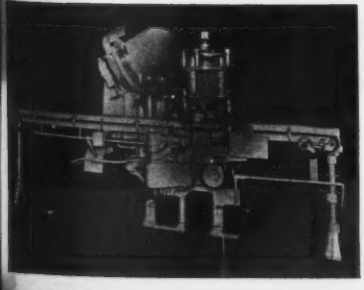
At Left—AUTOMATIC SAMCO VACUUM FILLER: Equipped with standard 12-heads this fully automatic machine is capable of speeds of 50/70 per minute on 1 oz. to 1 qt. sizes. Double bowl overflow system, high speed filling nozzles and quick size changes insure rapid dripless filling of free flowing or semi-free flowing liquids.

CAPPING

The flexibility of Pneumatic's Single-Head, Two-Head and Four-Head capping machine models makes handling of a wide size range entirely practical and relatively simple.

At Right—SINGLE HEAD CAPPER: Will sort, feed and apply any type of molded or metal turn-on closure to containers ranging from 1 oz. to 1 qt. at speeds up to 50 per minute. Machine is entirely automatic and requires less than 15 minutes for size change.

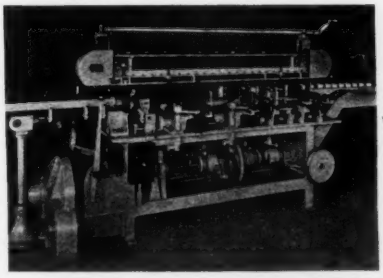




At Left—PNEU ROTARY CAPPER: A hi speed capping machine for handling a variety of sizes and shapes of bottles, cans, and jars at speeds up to 120 per minute.

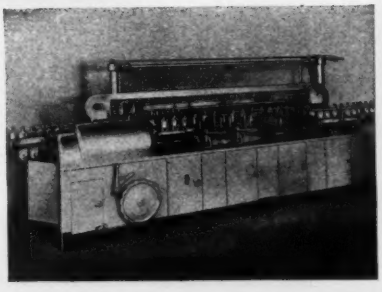
LABELING

Pneumatic's Simplex and Duplex Labelers safeguard the appearance of your containers by assuring precise, accurate register—dependable labeling at speeds up to 120 per minute.



At Left—SIMPLEX LABELER: One of several models for applying front only, front and back, two front and one back, or partial wrap-around labels to bottles, cans, and jars. Machine is fully automatic and can be changed from one size to another in less than 10 minutes.

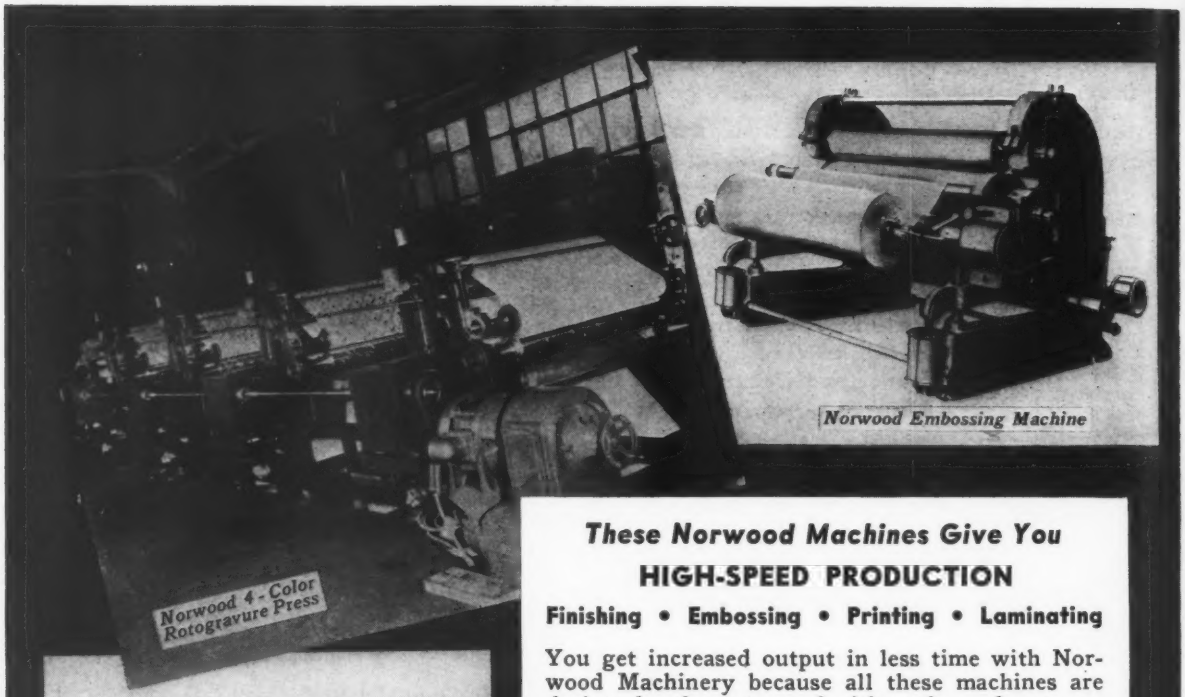
At Right—DUPLEX LABELER: Will apply front only, or front and back labels to containers ranging in size from ½ pt. to quarts at speeds up to 120 per minute.



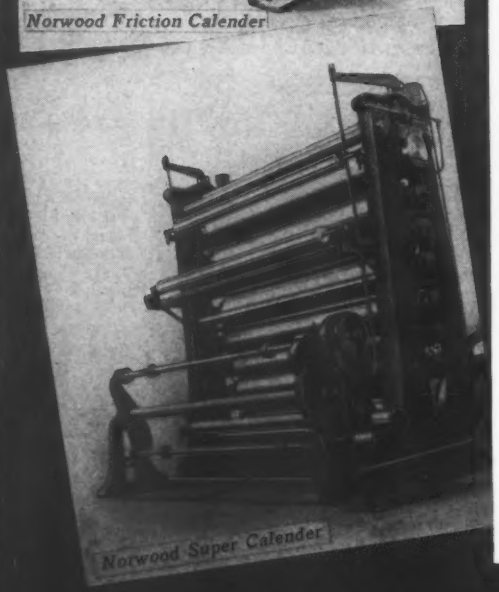
PNEUMATIC

PACKAGING & BOTTLING MACHINERY

PNEUMATIC SCALE CORP., LTD., 77 Newport Ave., North Quincy 71, Mass.







These Norwood Machines Give You
HIGH-SPEED PRODUCTION

Finishing • Embossing • Printing • Laminating

You get increased output in less time with Norwood Machinery because all these machines are designed and constructed with modern advantages. Norwood machinery enables you to operate at higher speeds . . . *to produce more . . . faster.*

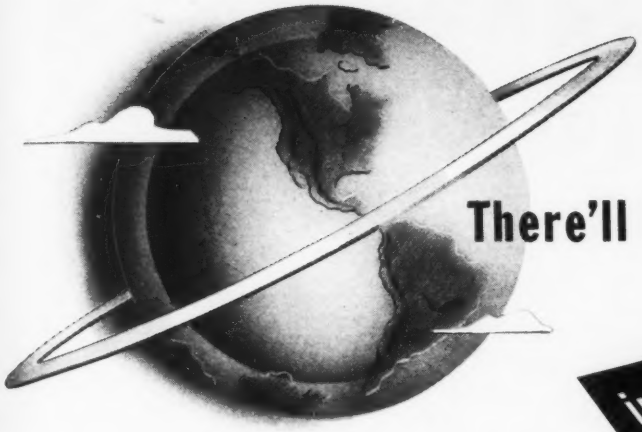
Norwood engineers have built better paper finishing and paper converting machinery for over half a century. They offer a complete machinery service. Some of the best known of Norwood machines are: Super calenders of all types, friction calenders, embossing machines, rotary coating units, folders, laminating equipment for all types of laminations, and Multi-Color Rotogravure printing machines.

In these machines Norwood builds such time-saving, money-saving advantages as pressure lubrication, complete anti-friction bearings, hydraulic and pneumatic pressure and hydraulic motor drives. In connection with drying equipment, such new developments as reflector drying and oxidation are featured. In every machine Norwood builds there are outstanding features that give more efficient operation . . . that give increased production . . . that mean savings in time and money for you.

For faster production, for increased output, investigate the advantages of Norwood equipment. For any trade, for any special purpose, Norwood can build special machinery. Whether you are interested in standard equipment or special machinery . . . whether you want to rebuild, modernize, or reconvert your present machinery . . . we'll be glad to work with you.

Write us about your problems, today.

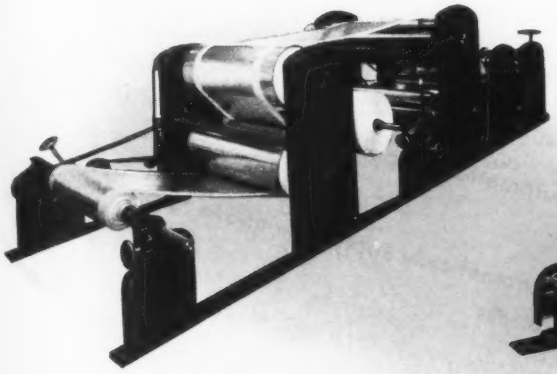
***The* NORWOOD**
ENGINEERING COMPANY
12 No. Main Street, Florence, Mass.

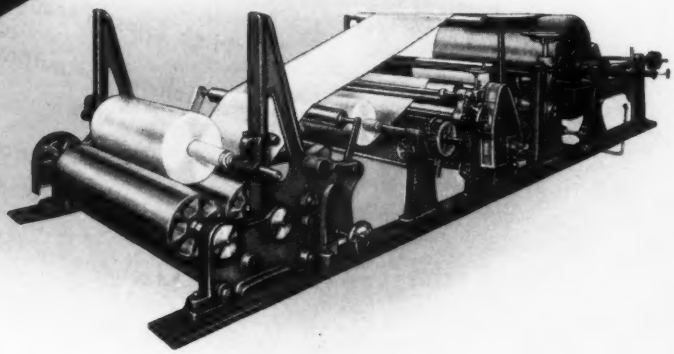


There'll be some changes made

in POST WAR PACKAGING

Post-war demands will call for many new type wraps and packaging materials. Therefore, your production equipment must be versatile and capable of easy change and adjustment. The two coating and laminating machines illustrated are previews of equipment which will be offered you by Hudson-Sharp when its war demands have been fully cared for. These are only a part of the many new machines designed to aid you in the production of better printed, coated, laminated, or embossed papers — to meet the perplexing requirements of your post-war customer. A letter with an outline of your needs will bring full particulars now, on machines we can build you later.





Note:

Open type construction with easy access to every operating unit. Units may be extended or compressed to lengthen or shorten sheet leads. Each complete operating assembly in machines may be replaced by others to meet new type production problems. Flush frame construction permits easy clean-up and adjustment.

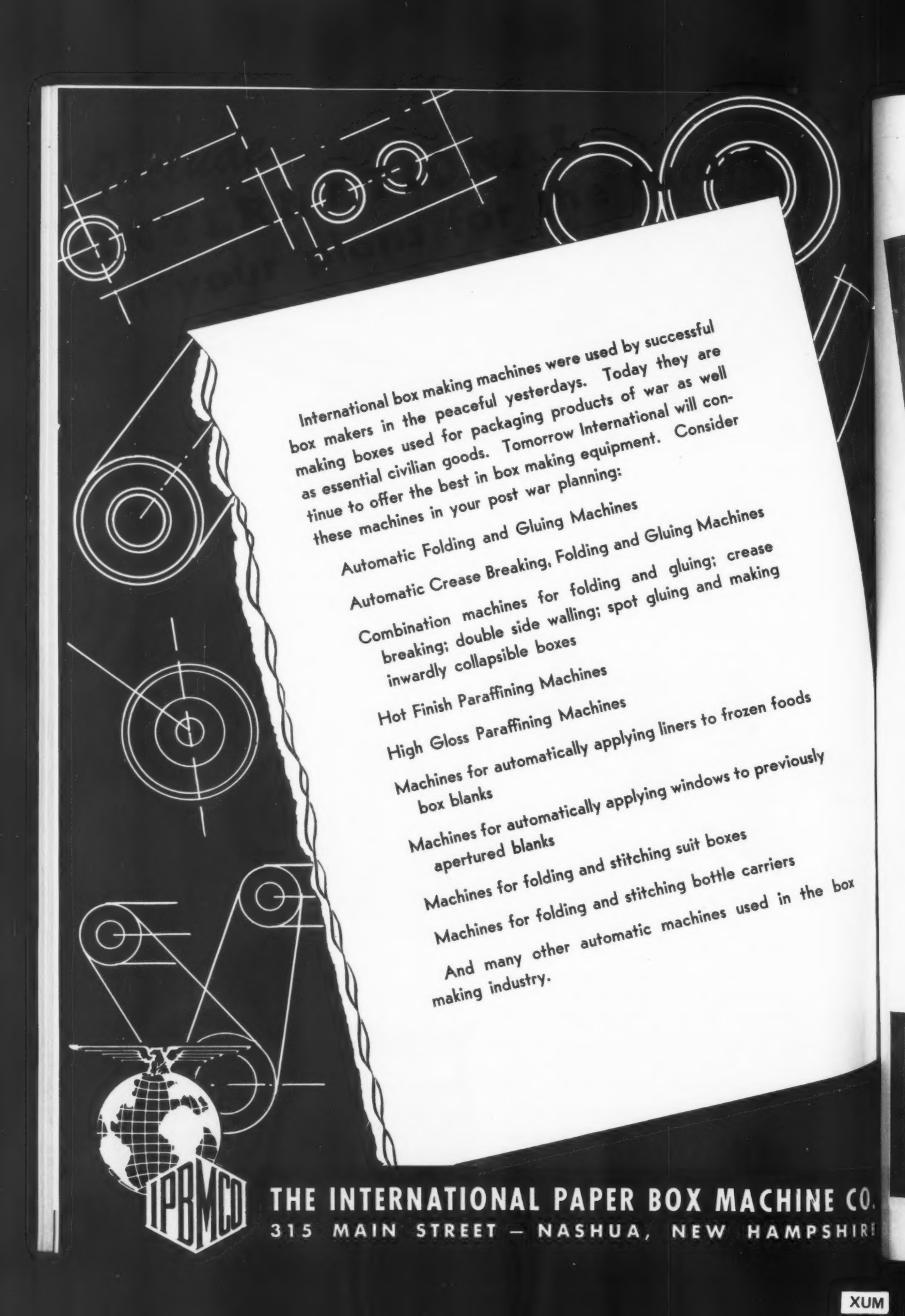


HUDSON-SHARP

MACHINE CO • GREEN BAY • WIS

Manufacturers of

Printers, Embossers, Folders, Interfolders, Waxers, Laminators, Wrapping Machines, Core Winders, Packaging Presses, Crepers and Napkins, Toilet Tissue and Paper Towel Units.



International box making machines were used by successful box makers in the peaceful yesterdays. Today they are making boxes used for packaging products of war as well as essential civilian goods. Tomorrow International will continue to offer the best in box making equipment. Consider these machines in your post war planning:

Automatic Folding and Gluing Machines

Automatic Crease Breaking, Folding and Gluing Machines

Combination machines for folding and gluing; crease breaking; double side walling; spot gluing and making inwardly collapsible boxes

Hot Finish Paraffining Machines

High Gloss Paraffining Machines

Machines for automatically applying liners to frozen foods box blanks

Machines for automatically applying windows to previously apertured blanks

Machines for folding and stitching suit boxes

Machines for folding and stitching bottle carriers

And many other automatic machines used in the box making industry.

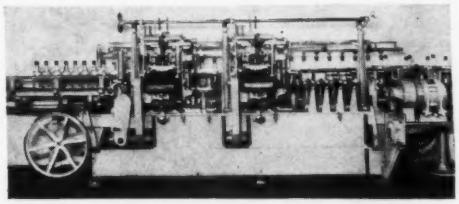
IPBMCO

THE INTERNATIONAL PAPER BOX MACHINE CO.

315 MAIN STREET — NASHUA, NEW HAMPSHIRE

WORLD LABELERS

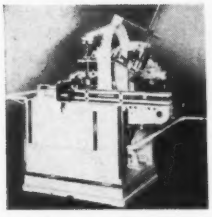
You get the best Labeler in the "WORLD", whether your job calls for continuous mass production, limited output, frequent changes of containers or label sizes and shapes, application of body labels, front or front and back labels, neck labels, foil or any combination. The WORLD'S best Labeler for you is backed by the unsurpassed engineering, production and service resources of an organization specializing in Labelers exclusively.



The WORLD BEE-LINE Labeler

is for superb, firm, precise application of front or front and back body labels — and neck labels simultaneously if desired — to round, square, oval, flat or panel containers. It conducts them swiftly, continuously and gently through the entire operation in a bee-line, without stops, detours, collisions, jars or jams. It is ideal for the modern light weight glass. The Model HG BEE-LINE does equally fine work on production labeling of gallon and half-gallon jugs and bottles.

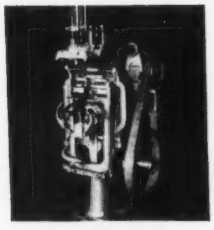
The World BEE-LINE High-Production Labeler (pictured above) is equipped with twin labeling stations to handle two bottles simultaneously while maintaining the same efficient labeling speed as the single station BEE-LINE Labeler.



The WORLD Turret Labeler

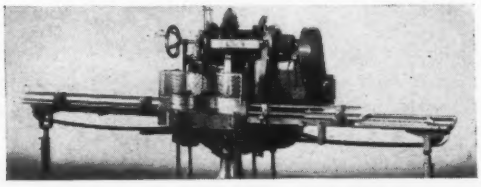
is for superfine, precision labeling of smooth, fluted or fancy containers at moderate cost. It is compact, sturdy, easy-to-operate.

TWIN-TURRET and TRIPLE-TURRET Labelers are available for higher production.



The WORLD Semi-Automatic Labeler, Model S

handles any size container from tiny samples to gallon jugs and any size and shape labels — body — body and neck — body, neck and foil — and all around the body of the container



The WORLD Rotary Labeler

is WORLD'S most dependable labeler for economical production labeling of all kinds of round bottles up to 4" diameter. It applies body labels, body and neck labels, or foil, singly or in one operation.

WORLD LABELER HEADQUARTERS

...at all times ready to assist you on all problems of label application, labeler selection, installation, operation, maintenance, etc.

"YOU GET THE BEST LABELERS IN THE WORLD"

ECONOMIC MACHINERY COMPANY

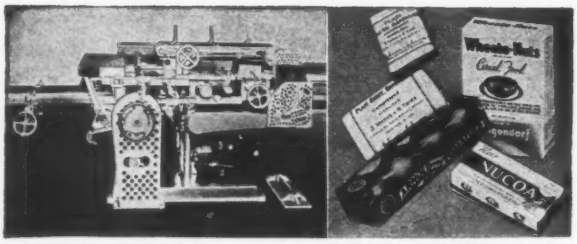
Builders of World Automatic and Semi-Automatic Labelers for Every Purpose

WORCESTER, MASSACHUSETTS

New York · Philadelphia · Pittsburgh · Chicago · San Francisco · Denver · Louisville · Salt Lake City · El Paso · Seattle · Portland · London · Montreal · Toronto · Winnipeg · Spokane · Vancouver · Sydney, Australia · Wellington, N. Z. · San Juan, P. R.

PACKAGE MACHINERY

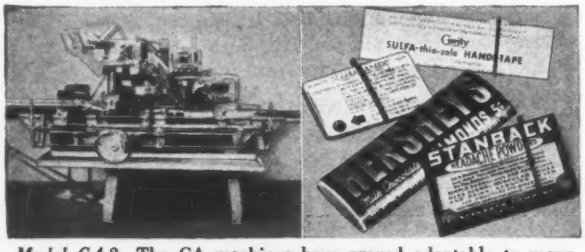
A wrapping machine for



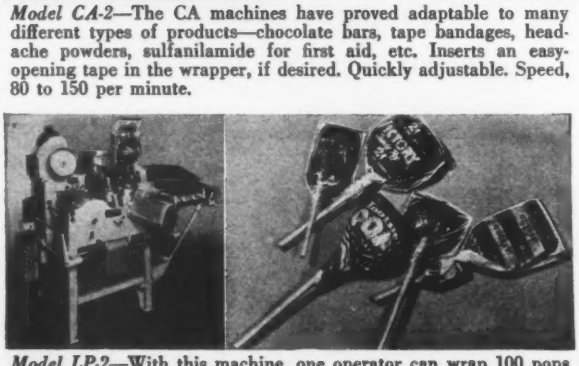
Model FA—An extremely versatile machine, quickly adjustable for a wide range of sizes. Handles open boats and flat objects as well as cartons. Uses any type of wrapping material. Speed, 90 per minute.



Model DF—Built especially for wrapping irregular shaped bars, this machine produces a uniformly sized, perfectly formed wrap, irrespective of product shape. Electric Eye locates the printed design accurately on the bar. Quickly adjustable. Speed, 110 per minute.



Model CA-2—The CA machines have proved adaptable to many different types of products—chocolate bars, tape bandages, headache powders, sulfanilamide for first aid, etc. Inserts an easy-opening tape in the wrapper, if desired. Quickly adjustable. Speed, 80 to 150 per minute.



Model LP-2—With this machine, one operator can wrap 100 pops per minute. Saves labor and 15% to 20% in wrapping material. Uses heat-sealing cellophane or waxed paper. Last fold and twist are sealed by heat.

Wide Experience plus the Right Machines

to give you lower costs and a better package

We have served package goods manufacturers ever since machines first replaced hand-wrapping, and have been instrumental in introducing numerous outstanding advancements. Each year has seen an increase in the variety of goods wrapped by our machines. This steady growth finds us today with the largest and most complete line of wrapping machines built by any single organization. Shown here are a few of our more than 80 basic models.

Widely adaptable—Adjustable for various sizes

Our machines are adaptable to many different forms of wrapping, and most models are quickly adjustable for a variety of sizes. They may be equipped to use any type of wrapping material.

Embodying the most advanced mechanical principles, our machines are designed to occupy the smallest amount of floor space, and operate at the highest speed consistent with quality wrapping. Some models now being supplied have twice the speed of the machines they are replacing.

Let Us Assist You

A study of your package and your present equipment may enable us to suggest important savings or improvements that will give your package new sales appeal.

Write or phone our nearest office

PACKAGE MACHINERY COMPANY

Springfield 7, Massachusetts

30 Church St., New York 7 • 111 W. Washington St., Chicago 2
101 W. Prospect Ave., Cleveland 15
443 S. San Pedro St., Los Angeles 13
32 Front St., W., Toronto 1



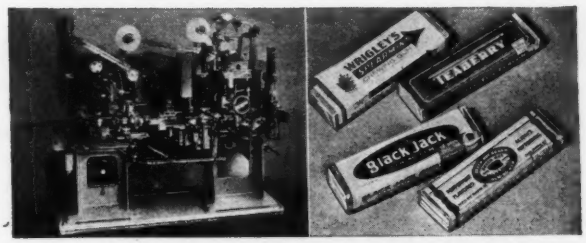
Write for our new book "Sales Winning Packages"

COMPANY SPRINGFIELD, MASS.

every wrapping purpose



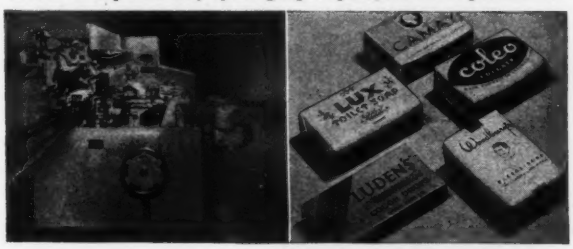
Model CM-2—Wraps small packages at extremely high speed—up to 250 per minute. Inserts easy-opening tape, if desired. Easily adjustable for various sizes.



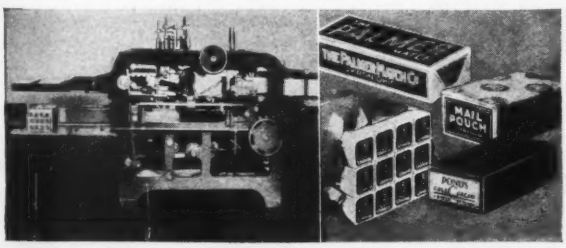
Model AC—Makes the standard chewing-gum package, performing all operations. Wraps and bands each stick individually, assembles five sticks, then bands package with printed label and applies cellulose wrap with easy-opening tape. Speed, 600 sticks per minute.



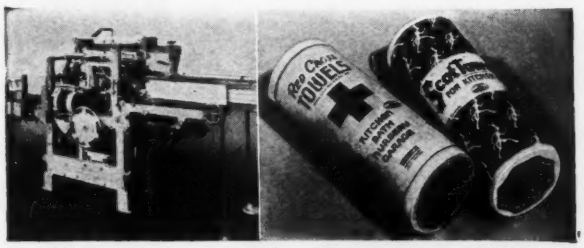
Model 22-B—Wraps candy in individual pieces. Handles hard or soft-center pieces in many sizes, odd and fancy shapes. Does combination type wrapping (for example, inner wrapper of foil, outer wrapper of transparent cellulose). Speed, 120 to 150 pieces per minute.



Model S-2—Used by leading soap makers. Handles many styles of wrapping. Adjustable for different sizes. Inserts cardboard or circular, if desired. Speeds up to 200 per minute. This machine has also been adapted to other products.



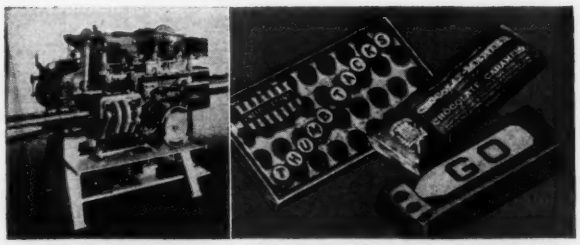
Model F-10 Bundler—An adjustable machine for bundling packages in various quantities. Registers printed panels accurately. Attaches end seals. Machine bundling makes striking savings in both labor and material costs.



Model F-9—Wraps paper towels and toilet tissue in roll form, attaching end seals.



Model HRB—A new razor-blade wrapping machine with a speed of 150 blades per minute. Applies inner waxed-paper wrapper and outer printed wrapper at one time. No part of machine touches sharpened edges of blade.



Model GH-2—The ideal machine for wrapping small candy pieces, cookies, etc., or similar objects on a cardboard tray. Forms the tray from previously scored board. Registers wrapper accurately by electric eye. Speed, 70 to 80 per minute.

LABELING EQUIPMENT

TABLE-SIZE LABEL GUMMERS

Made in five sizes; 6 to 27 inches for wide variety of work. Sturdily built to last. Will not shimmy. Has self-cleaning feature.



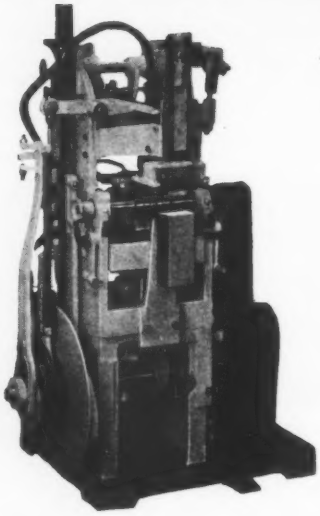
THE MICRO ADJUSTMENT

PERFECT REGISTER speeds up to 50 a minute

SEMI-AUTOMATIC

PONY LABELRITES

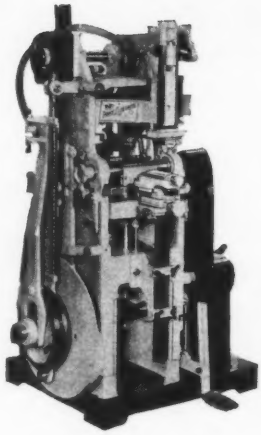
ELIMINATES GLUE-WIPING (self-cleaning feature



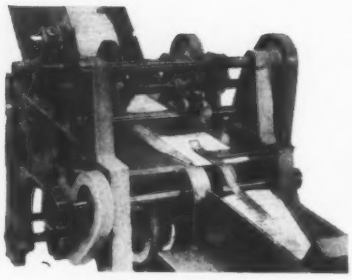
SOLVE HELP-SHORTAGE

in labeling

BOTTLES—JARS—CANS CONTAINERS—BOXES



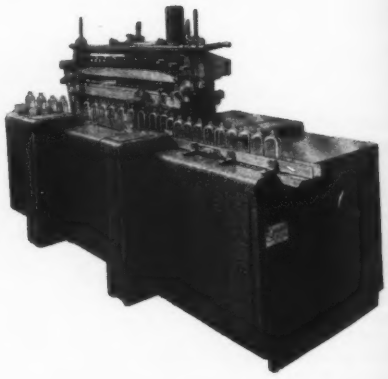
The PONY LABELRITE has long been recognized as the most effective and economical unit adaptable to production lines, and suitable for tiny flasks to gallon jugs; for bulk cans, box-labeling, for unusual shapes and for applying labels direct on products. It eliminates the necessity for wiping of excess glue because of the positive glue control. Change parts are petty cash items; not major expenditures. Handles labels from postage stamp size to sizes up to 6½ x 7½.



CODE-O-MATIC applies code numbers, or batch identification to labels as required. It is a portable unit.

fully AUTOMATIC LABELRITES

We have made scores of speedy, fully automatic LABELRITES, many of them with special attachments required for specific work. Labeling ONE side, BOTH sides, or even TWO on one side, with precision register, for volume production is LABELRITE'S efficient function. There are many **types** of fully automatic LABELRITES.



MOTOAIR, a pressure or vacuum pump, for packaging units used in filling, cartoning and paper handling operations.



New Jersey Machine

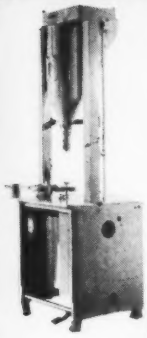
CORPORATION

1800 Willow Avenue — HOBOKEN, N. J.

325 W. HURON ST. CHICAGO, 10, ILL.

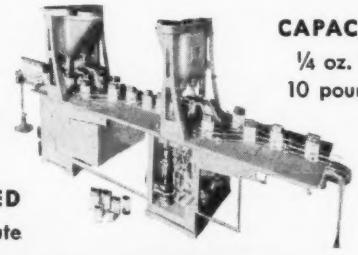
1701 CAREW TOWER CINCINNATI, OHIO

S&S FILLING · PACKAGING · WRAPPING MACHINES



FILLING MACHINES

SEMI-AUTOMATIC
FULLY-AUTOMATIC
SINGLE and DUPLEX TYPES
FILLS
CANS • JARS • BOXES • CANISTERS



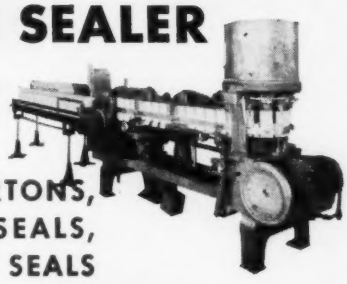
MATERIALS
Pastes — Powders
Granular Products
or any Free Flowing
Materials

CAPACITY
¼ oz. to
10 pounds

PRODUCTION SPEED
15-30-60-120 per minute

NEVERSTOP CARTON FILLER and SEALER

Several Models



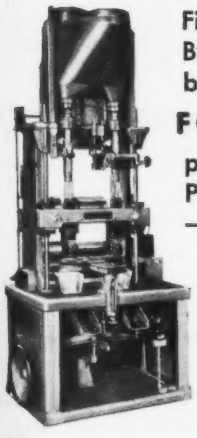
FEEDS CARTONS, BOTTOM SEALS, FILLS, TOP SEALS

MATERIALS
All Food and Grocery Products in Cartons

CAPACITY
Maximum Carton — 10½" x 6½" x 4½"
Minimum Carton — 2¾" x 1⅝" x ¾"

PRODUCTION SPEED: 40 to 120 per minute

TRANSWRAP PACKAGING MACHINE



Filling by measurement or counting. By auger or centrifugal feed—or, by hand feed.

FORMS • FILLS • SEALS
packages made of Cellophane, Pliofilm or other heat sealing films — *from the roll — plain or printed.*

MATERIALS
Coffee — candy — nuts — crackers — pills powders — individual pieces.

CAPACITY
⅛ oz. to 1 lb. — volume not over 56 cu. in.

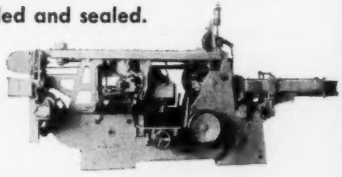
PRODUCTION SPEED
50 to 60 per minute

TIGHT WRAPPING MACHINE

Automatic

TIGHT-WRAPS CARTON WITH PRINTED LABEL
after it is filled and sealed.

Makes attractive, sitless, tight-wrapped package



MATERIALS: All products in cartons

CAPACITY
Maximum Carton — 10" x 6½" x 4"
Minimum Carton — 3¾" x 1½" x 1"

PRODUCTION SPEED: 60 to 70 per minute

S&S

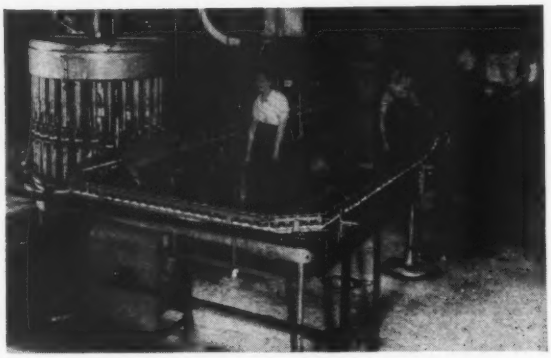
HORIX MANUFACTURING COMPANY

PITTSBURGH 4, PENNA.

CHAIN CONVEYORS FOR BOTTLES, JARS, and CANS • GRAVITY CASE CONVEYORS

CHAIN CONVEYORS

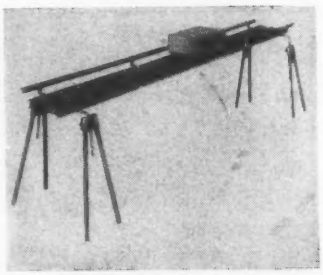
- Power units, constant or variable speed
- Right angle corners
- Transfer discs
- Case unscramblers
- Semi-automatic corkers



Horix Chain Conveyor, with Horix Automatic High Speed Filler, Installed at Port Arthur, Texas, for Gulf Refining Corp.

GRAVITY CONVEYORS

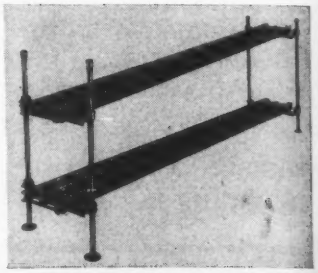
- Straight sections, 8, 10, 12 ft. long
- Reversible curved sections 45 and 90 degrees
- Portable or permanent supports
- Guard rails
- Work table belt conveyors



Conveyor with Guard Rails and Portable Tripod Supports

GRAVITY

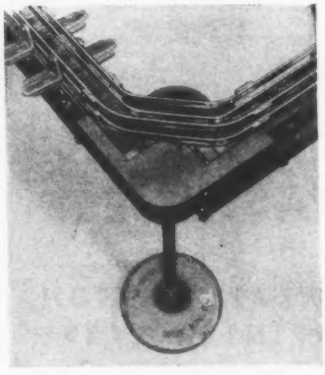
For carrying cases or cartons to and from any place on the floor. Comes in easy-to-handle portable sections, or can be permanently mounted. Built as rugged as an automobile frame of channel steel, X braced. Triple tired rollers are constructed of special ball bearing steel, cadmium plated to prevent rust. Rollers are spaced to provide proper and adequate support for paper cartons. Various models carry from 50 to 100 lbs. per sq. ft. and handle packages from 7" x 7" up to 18" wide. Sections can be built in special widths, and curves can be had of any radii to meet your special needs.



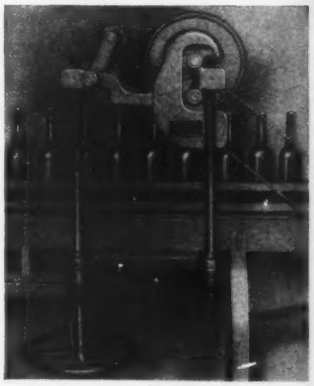
Double Deck Permanent-type Conveyor Stand

CHAIN

Chain conveyors are built as an integral part of our rotary fillers, or can be built in separate units to meet your specific requirements. Driven from filler, or equipped with separate power units. Available for use with Horix chain conveyors are right angle corner, transfer discs, accumulating tables, a semi-automatic corker, and a case unscrambler. A complete conveyor line for handling glass or tin containers.



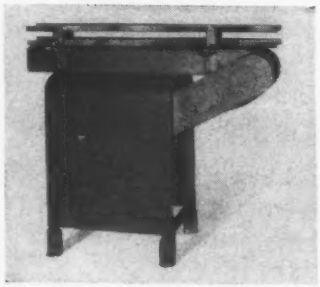
Right-angle Corner for Chain Conveyor



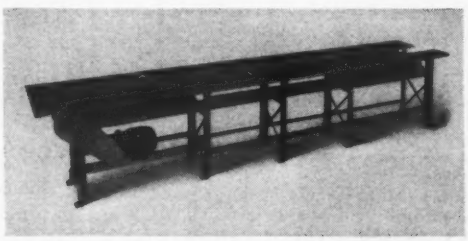
Semi-automatic Corker

BELT

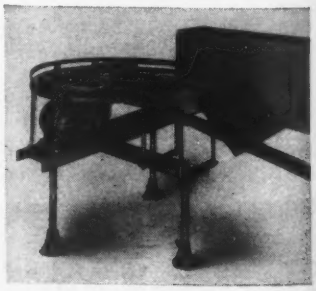
The Horix work table conveyor is built on a heavy steel angle frame, bolted and electric welded. Work boards are clear pine, 12" wide, sanded and spar varnished. The belt is 3 ply, 24 oz. duck, with $\frac{1}{16}$" black synthetic rubber top, and friction bottom, 12" wide. Belt stretch is compensated by an adjustable take-up. Working surface of the belt is supported on hard maple runner strips to prevent sagging. Return belt is supported on ball bearing rollers. Work table conveyors can be built to order in any desired length.



Power Unit for Motor-driven Conveyor



Work Table Conveyor

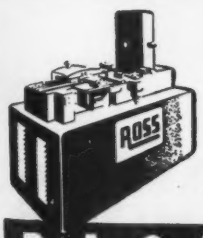


Case Unscrambler



THE *Ross* WAY IS THE *New* WAY

Look to ROSS for leadership in streamlined automatic and semi-automatic adjustable packaging machinery. ROSS carton forming machines are composed of close tolerance, high precision parts. This exclusive ROSS feature assures greater efficiency of operation, with shut downs due to replacements practically non-existent. With speedy, versatile adjustability through precision dial controls — no oiling, all moving parts self-oiled — ROSS automatic and semi-automatic adjustable machines have Master Speedrangers giving speeds from 40 to 120 a minute or greater. Look to ROSS for assistance in your packaging problems. Write for complete information.

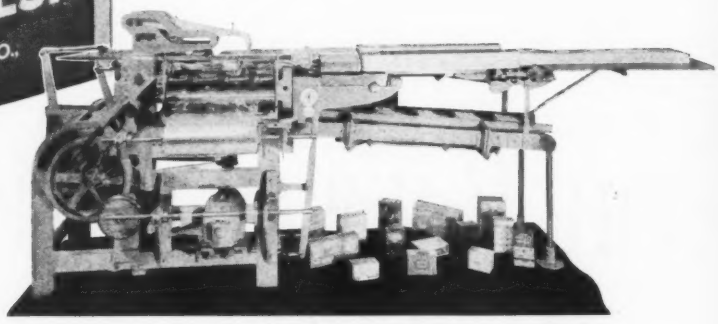


A. H. ROSS & Co. LUDLOW • KENTUCKY

PACKAGING MACHINERY



AT THE POINT-OF-SALE YOUR PACKAGE SHOULD APPEAR ATTRACTIVE . .

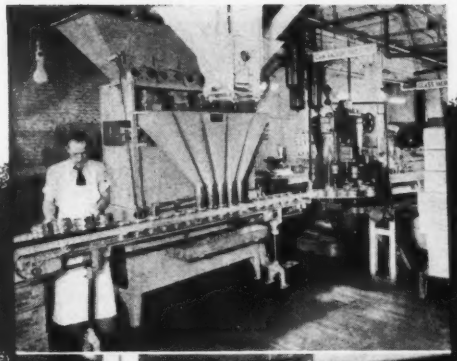


- Low capital investment
- Fully automatic
- Simplicity of design
- Low upkeep cost
- High speed wrapping with variable speed change
- Perfectly wrapped packages
- Fully adjustable
- Thermostatically controlled electric sealing
- Photo-electric cell registration
- Always dependable
- One attendant, man or woman

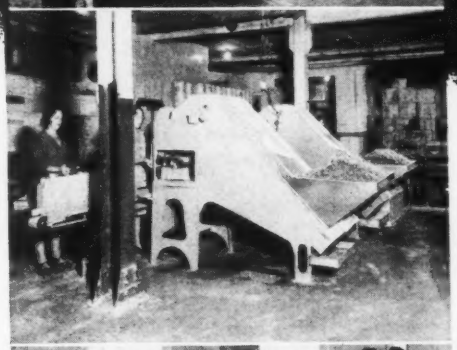
Packages that are pleasing to the eye invite the purchaser's attention and reach the market basket more often than their unkempt rivals. The housewife likes to buy a product that radiates quality, for she knows that to spend wisely adds to her prestige as a capable home manager. Therefore, in packaging your products, it is advisable to watch every little detail; to see to it that your wrapping equipment is really giving the best type of service obtainable. The Hayssen Mfg. Company has made your wrapping problems their problems. For more than thirty-five years they have produced package wrapping machinery that has anticipated future needs. Their experience in the package wrapping field is at your service. Contact them today, as you plan for the future. You'll be under no obligation.

HAYSSEN MFG. COMPANY • Sheboygan, Wis.

HAYSSEN ELECTRONIC CONTROLLED **WRAPPING MACHINES**



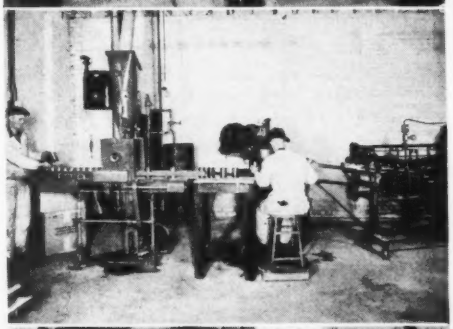
COFFEE



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SPICES

TRIANGLE

Planned Packaging

WEIGHERS - FILLERS - CARTON SEALERS AUGER PACKERS FOR MORE EFFICIENT PACKAGING OF ALL DRY PRODUCTS

Triangle makes over 60 types of machines, for packaging everything from frozen rivets to marshmallows. Triangle equipment takes the headaches out of packaging by increasing production, saving labor and producing more attractive packages. No matter what dry product you package, what type of container you use or what your production requirements are —Triangle can help you. For complete information, send a sample filled package and state production required.

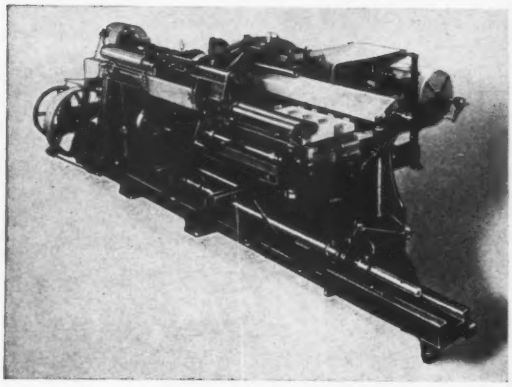
Offices in New York, 230 Park Ave., 50 Church St.; Denver, 1525 Wynkoop St.; Cleveland, 5927 Euclid Ave.; Birmingham, 901 S. 38th St.; Los Angeles, 1501 W. Jefferson Blvd.; San Francisco, 111 Main St.; North Quincy, Mass., 139 Elliot Ave.; Dallas, 6530 Robin Road; Memphis, 710 South 4th St.

WRITE FOR NEW 20 PAGE BULLETIN

ARMY E NAVY

TRIANGLE PACKAGE MACHINERY CO.

908 NO. SPAULDING AVENUE. CHICAGO



KNOWLTON AUTOMATIC
CONVOLUTE PAPER CAN WINDER

A COST SAVING MARVEL!



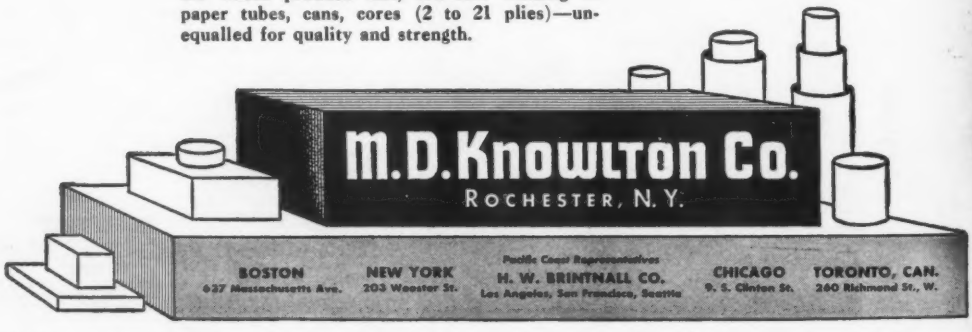
Manufacturers and packagers everywhere are realizing substantial savings in packaging and production costs with the Knowlton Automatic Convolute Paper Can Winder.

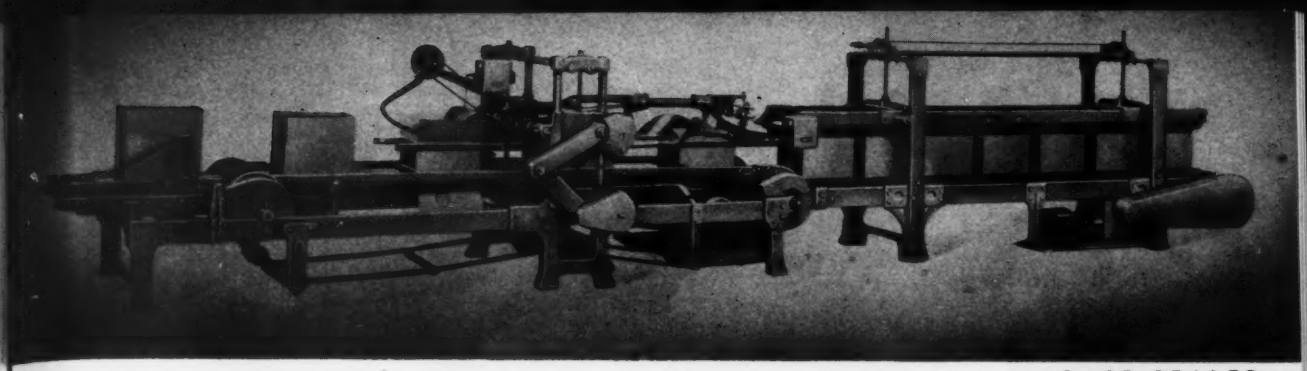
This winder produces low cost, easily fabricated paper can bodies of superior strength, accuracy, and quality, which can be readily substituted for more expensive metal or composition materials. And—because paper cans are able to be made in many attractive shapes and designs, it means greater sales appeal for your packages.

Ruggedly constructed for high speed production, the Knowlton Winder automatically and simultaneously produces 1 to 5 paper can bodies labeled and ready to receive paper or metal ends.

Write today and let Knowlton engineers solve your packaging problems at *lower cost.*

Knowlton also manufactures Spiral Tube Winders which produce fast, low-cost winding of paper tubes, cans, cores (2 to 21 plies)—unequalled for quality and strength.



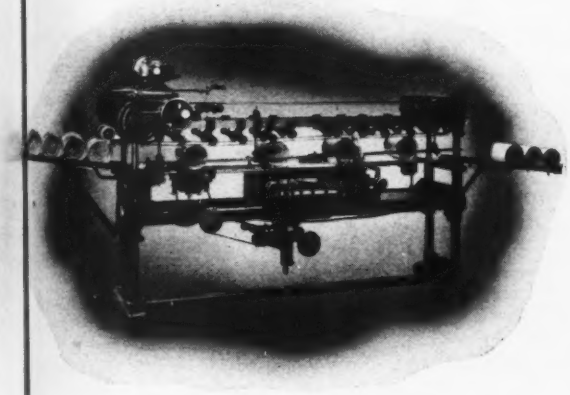


CASE SEALER

LABELING-SEALING-CASE PACKING-BAG PACKING

ALL AROUND YOUR PACKAGING LINE

LABELER



BOTTLE PACKER

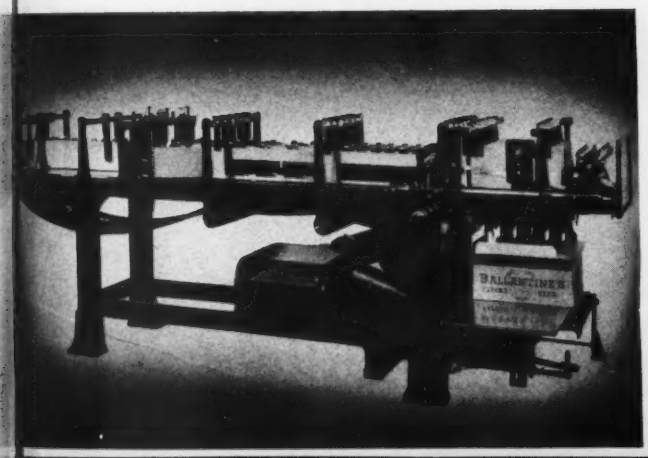
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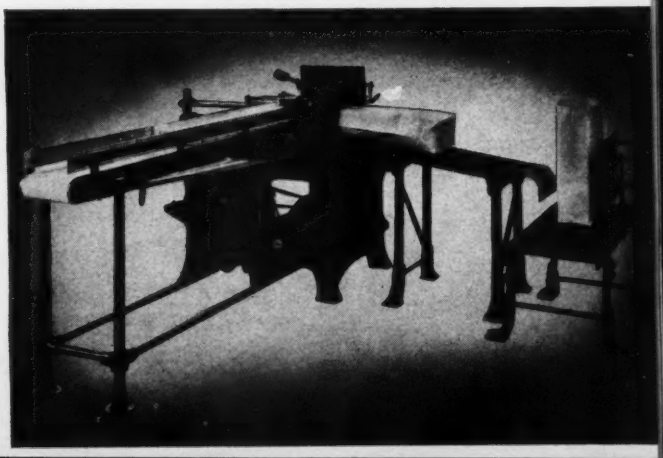
STANDARD-KNAPP

We can't show you all the machines that we make. But picturing a variety, however, we have tried to indicate the versatility of our packaging machinery, design and building service.

STANDARD-KNAPP case sealers are used in most of the leading plants of most high production packaging industries, including beer, cigarettes, household products, canned soups, etc. Other STANDARD-KNAPP machines have also become standard for quality in various operations. In addition, we have constantly developed new types of equipment for specialized packaging purposes as for instance the bag packer developed for the sugar industry and shown on this page. Whether it is a variation of one of our proved machines, or a new design to handle some new packaging operation, we think we can give you the right answer.

BAG PACKER





STANDARD-KNAPP CORPORATION

MANUFACTURERS OF CASE SEALING, CASE PACKAGING, AND CAN LABELING MACHINES

FACTORY and GENERAL OFFICES — PORTLAND, CONNECTICUT

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XUM

Saw-Way Announces a



Sara-Seal by Saw-Way

New Triumph in Packaging

HERE is the first published picture of the new Sav-Way Sara-Seal . . . the miraculous packaging and sealing machine which automatically encases anything from a ball bearing to a gyro-compass in a moisture proof, air-tight, floating bag of glistening transparent plastic. Designed for Saran*.

Today, Sav-Way Sara-Seal is available only to the Armed Forces and their suppliers . . . for the fast, sure packaging of radar equipment, aircraft parts, delicate surgical instruments, precision gauges . . . in fact, any critical war material that must arrive at its destination protected from the corrosive action of moist salt air and from dust laden atmosphere.

Tomorrow, Sav-Way Sara-Seal will play an important part in the packaging of countless perishable commodities . . . fruits, vegetables, baked goods, confections, nursery products, chemicals, cosmetics, paper, silverware. Wherever it is desirable to keep moisture either in or out, or to protect natural or manufactured products from contaminating atmosphere, Sav-Way Sara-Seal will find work to do.

Complete Description and Photographs
Will be Mailed upon Request

*Trade Mark Reg. U. S. Pat. Off.

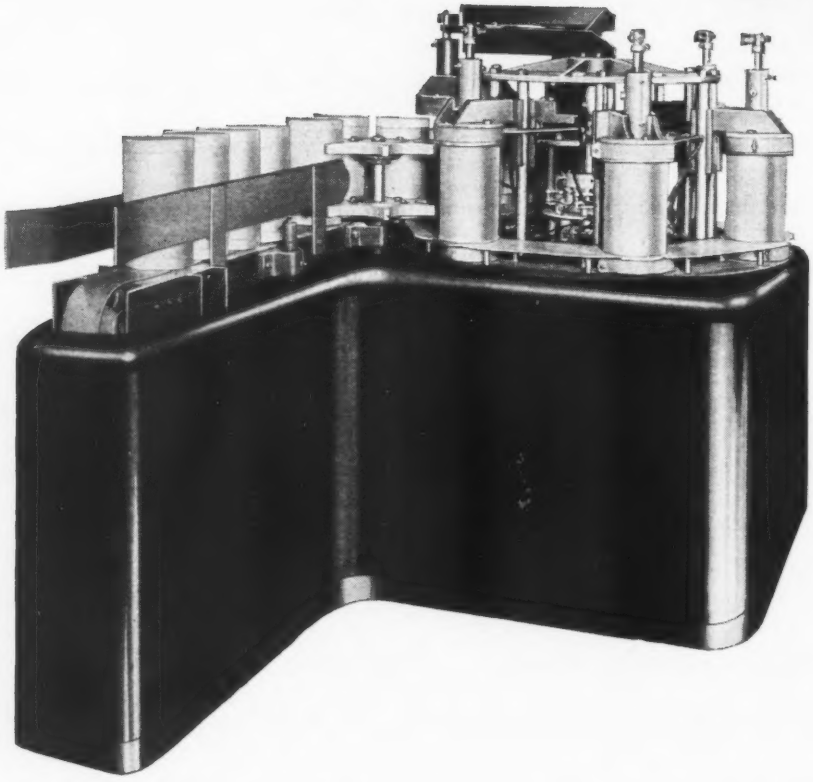
Sav-Way INDUSTRIES
Machine Tool Division
BOX 117, HARPER STATION, DETROIT 13, MICHIGAN

BUILDERS OF HAND AND HYDRAULIC INTERNAL GRINDERS • PRODUCERS OF GOLD SEAL SPINDLES • PLUG GAGES • MICROMETER CHECKERS PRECISION AIRCRAFT, AUTOMOTIVE, AND ORDNANCE PARTS

XUM

Designed for efficient

Postwar Packaging



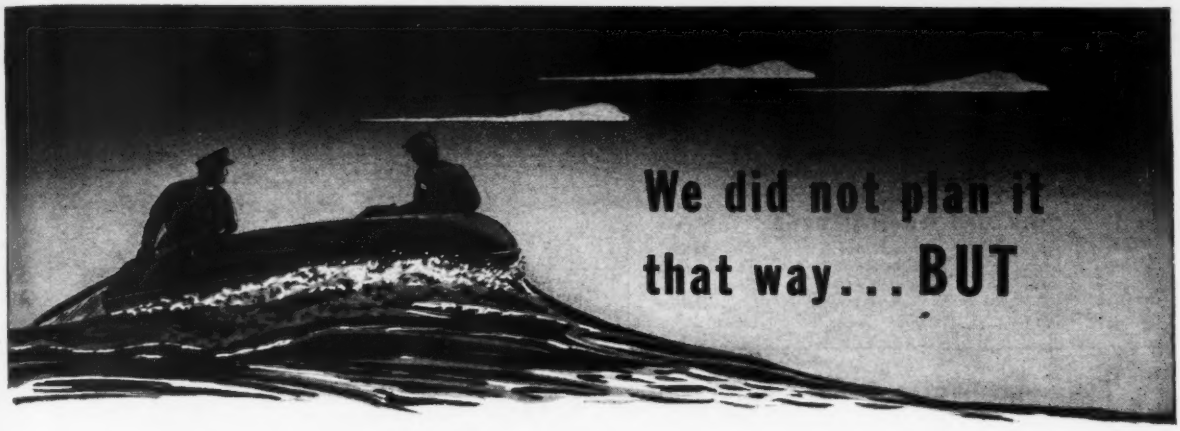


Let the ABC Man "engineer" *your* packaging requirements.

In the competitive postwar period, new sensational developments of the ABC Engineering Staff will solve many problems for the manufacturers of packaged products.

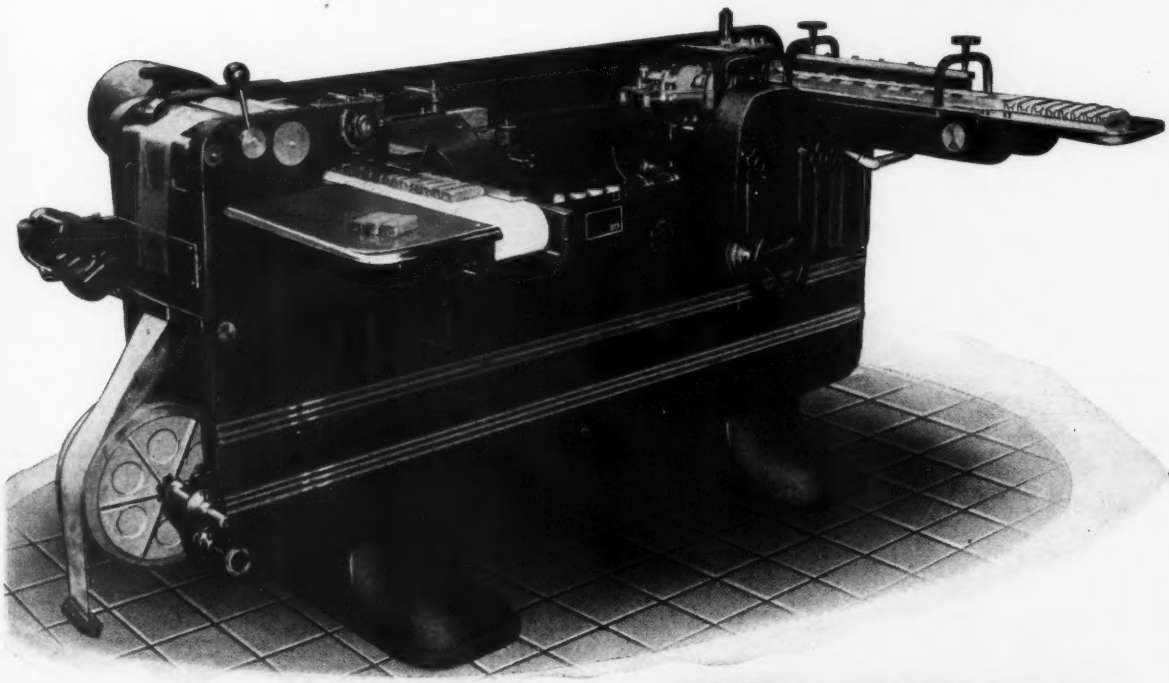
- Hand Gluers
- Cap Shrinkers (illustrated above)
- Automatic Case Sealers
- Semi-automatic Case Sealers
- Automatic Carton Sealers
- Top and Bottom Carton Sealers
- Tube Cut-off Machines
- Automatic Weighing Machines
- Volumetric Fillers

ABC PACKAGING MACHINE CO.
QUINCY, ILLINOIS



ARMY E NAVY

When American chemical genius produced a material which enabled plane and shipping castaways to brew fresh water from the salt water around them — the material had to be waterproof wrapped. This machine which Hudson-Sharp had prepared for post-war production was drafted for the purpose and has been on the job night and day since it joined the Armed Forces. While we are permitted to build a few of the units for production of Army and Navy Products, they cannot be obtained for civilian production until "V" Day.



The machine illustrated will wrap candy bars and similar products at high speed with no cardboard insert required. It completely seals all portions of the wrap. Later we will have machines of a similar design for wrapping practically any product of standard design. We will be glad to tell you more about it if you are interested.

HUDSON-SHARP

MACHINE CO • GREEN BAY • WIS

Manufacturers of

Printers, Embossers, Folders, Interfolders, Waxers, Laminators, Wrapping Machines, Core Winders, Packaging Presses, Crepers and Napkins, Toilet Tissue and Paper Towel Units.

HORIX MANUFACTURING COMPANY

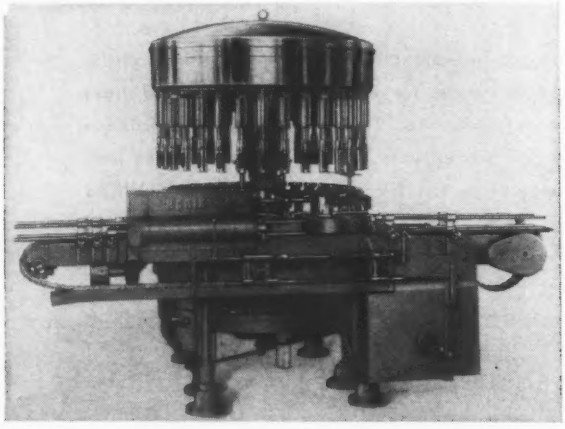
PITTSBURGH 4, PENNA.

HIGH SPEED AUTOMATIC AND SEMI-AUTOMATIC BOTTLE AND CAN FILLERS

PRODUCTS HANDLED

Whiskey	*Bluing*	*Medicines*	*Chili Sauce*
Wine	*Catsup*	*Extracts*	*Tomato Pulp*
Liqueurs	*Vinegar*	*Drugs*	*Soups*
Gin	*Syrup*	*Insecticides*	*Clear Jellies*
Water	*Brine*	*Fruit Juices*	*Oils*

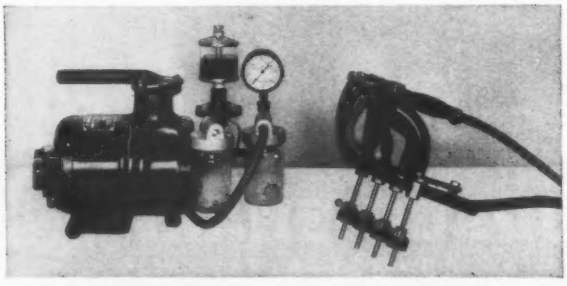
Fully Automatic Rotary Fillers



Suitable for plants requiring maximum continuous speed with minimum labor. Feed, filling, and discharge are completely automatic. Automatic safeties prevent damage and lost time due to defective containers. Bottle fillers available in 9, 14, 18, 21, 24, 28, and 32 valve sizes. Will fill all types of containers up to 400 a minute. Fills are uniform, without drip or waste. Safety devices automatically stop the machine in case of jams at infeed or discharge, preventing damage to filler and costly production delays.

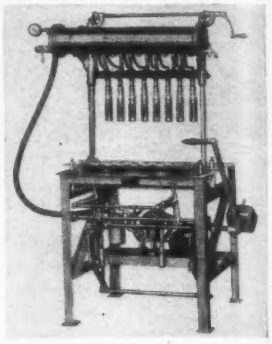
Can fillers are built with 18 or more filling valves to suit requirements, filling soups, fruit juices, etc., and syruping or saucing beans, spaghetti, etc., at speeds up to 250 cans a minute. Operate with all standard washers or closing machines. Easily dis-assembled for cleaning or adjusting. Sturdily constructed to insure dependability and long life.

Model TV Portable Vacuum Filler



A simple, easily-operated machine of wide adaptability. Consists of compact motor-pump unit, with built-in switch; lightweight filling head, with quickly adjustable valves; over-flow jar; necessary hose connections. Motor can be attached to any light socket. Filling head balanced to minimize fatigue. Corrosion-resisting contact parts, easily cleaned, furnished to suit requirements.

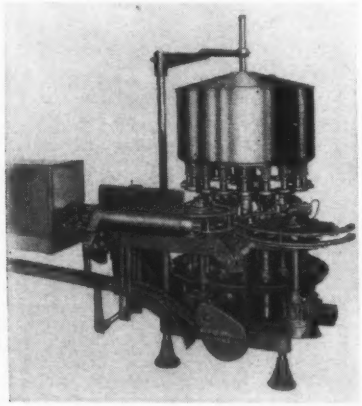
Model NV Straight-Line Filler



Ideal for filling small lots of different products into a variety of containers. Handles any shape or size of bottle from 4 oz. to 1 gal. Change from one size container to another is quickly and easily made. Empty bottles are fed by hand. Fills 4 to 12 bottles at a time, depending on their size. Whiskey can be filled at rate of 45 pints a minute. Filled bottles can be discharged onto a moving conveyor. Does not require expert mechanics for satisfactory operation. Exclusive Gravity-Vacuum System prevents loss due to defective bottles.

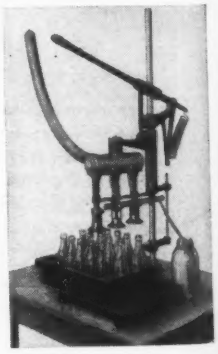
All parts accessible for cleaning. Stainless steel contact parts can be supplied, at extra charge.

Automatic Rotary Jelly Fillers



This machine fills jelly at the rate of 225 one-pound containers per minute. It handles tapered and straight side tumblers as well as jars at speeds hitherto unattainable. Automatic instant shut-off minimizes valve drip. Specially designed worm feed prevents breakage even at speeds of 250 per minute. Filled containers are delivered to the closing machine smoothly—without spill.

Gravity Bench Type Fillers



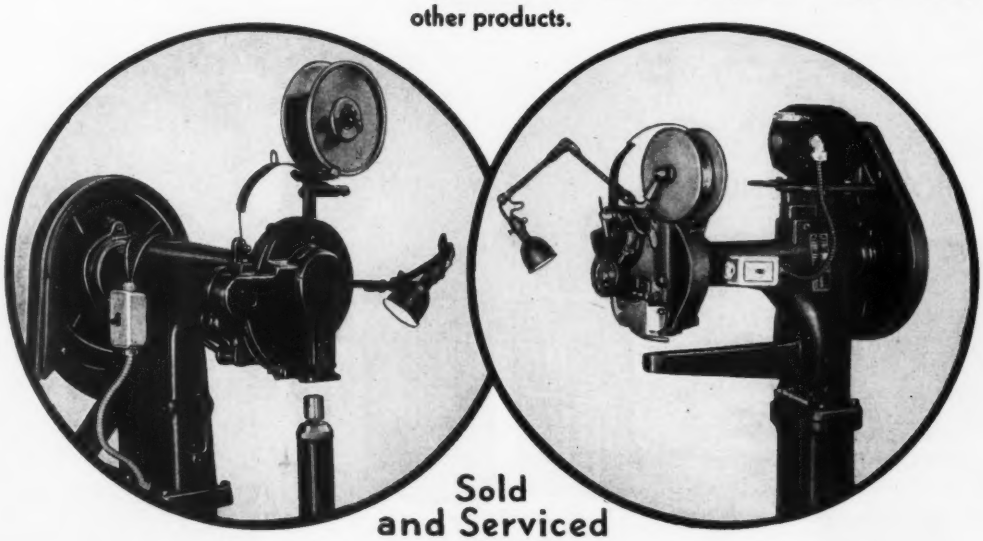
A simple, efficient machine that will quickly save its moderate cost by reducing product loss. Although hand activated, filling is automatic to a predetermined height. By use of special feed trays various size containers can be handled, at speeds of 10 to 20 a minute, depending on product and size of containers. Fills screw cap cans and jugs, as well as bottles from miniatures to 7 inches in diameter. Handles a wide variety of light or heavy liquids, including patent medicines, flavoring extracts, catsup, chili sauce, waters—all filled accurately, with minimum waste.

BOSTON-BLISS-LATHAM

WIRE STITCHING MACHINES

FOR ASSEMBLING AND SEALING
CORRUGATED AND SOLID FIBRE SHIPPING CASES

Equipment for Stitching Set Up and Folding Boxes, Telescope Boxes, Display Cartons, Shopping Bags, Book Matches, Milk Bottle Caps, Pocket Books, Belt Loops, Luggage, Toys, Sheet Metal, and a Large variety of other products.



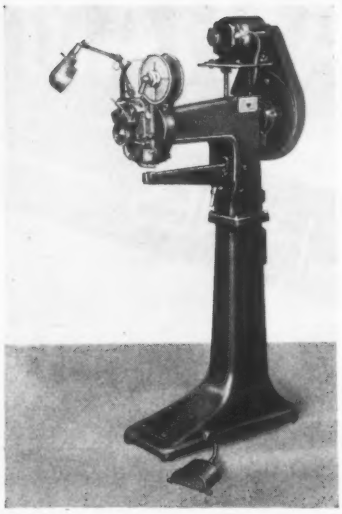
Sold
and Serviced
by

DEXTER FOLDER COMPANY

330 West 42nd St., New York, N. Y.

BOSTON	PHILADELPHIA	CHICAGO	CINCINNATI
143 Federal St.	Bourse Bldg.	117 W. Harrison St.	1335 Paxton St.

BOX STITCHERS



1. Bliss Heavy Duty Box Stitcher

Built for heavy duty work on all grades and thicknesses of boxboard used for corrugated and solid fibre shipping containers; also suitable for telescope containers, suit boxes, set-up boxes, folding boxes, cracker caddies, display boxes, etc.

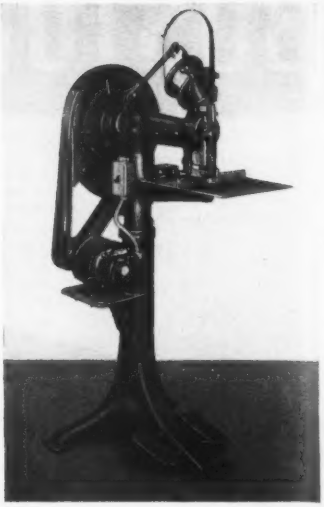
May be equipped with tables or gauges. Furnished with standard 90° or 45° Stitcher Head; uses standard ribbon and Hybar wires, also other flat and round sizes.

Throat lengths—15″, 25″ or 33″ and longer. Speed from 240 to 400 stitches per minute. Solenoid control if desired.



2. Improved Latham No. 34 Box Stitcher

This new Latham is a moderately priced machine for stitching the regular run of boxes, containers and bags used by mail order, clothing manufacturers, and similar industries. Working parts are stronger and heavier than those of previous models, and concealed for protection against dust and grit. Uses .017 or .020 ribbon wire; No. 1 or No. 2 Hybar wire. Crown of stitch, 7/16″. Capacity .360 inch. Speed up to 300 Stitches per minute. ¼ HP Motor. Throat length, 12″.



3. Boston No. 10 Box Stitcher

A light model machine equipped with the Boston No. 26 Narrow Stitcher Head. Adapted for light stitching operations, either on boxes or flat work such as bag sealing and attaching articles to cards.

Wire used, 21 × 25 flat or 25 to 28 round. Work up to ¼″ in thickness may be stitched. Crowns may be furnished for 3/8″ or ½″.

Machine may be equipped with standard table. Distance from stitch to inside edge of frame is 10 inches.

SAMPLES OF BOX STITCHING



Folding Suit Box



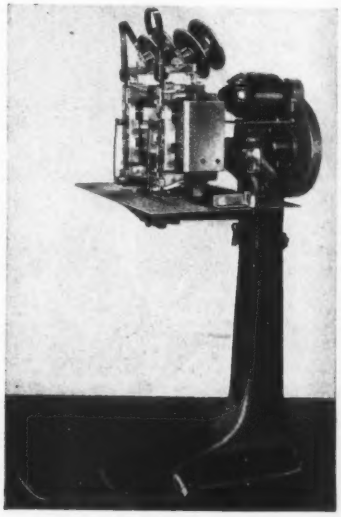
Filled Package



Hardware Box



Shopping Bag



4. Boston Multiple Head Stitcher

Uses No. 15 Type Heavy Duty Boston Stitcher Head. Heads are adjustable sidewise, with a minimum spacing of 3″ from center to center, and maximum spacing up to 16″. Uses ½″ crown stitch.

Drives all sizes of ribbon and Hybar wire also other flat and round sizes.

Used for stitching suit boxes, cartons and other types of folding or set-up boxes, and for any other stitching requiring two or more stitches uniformly spaced.

Available with solid clincher or moving clincher as ordered.

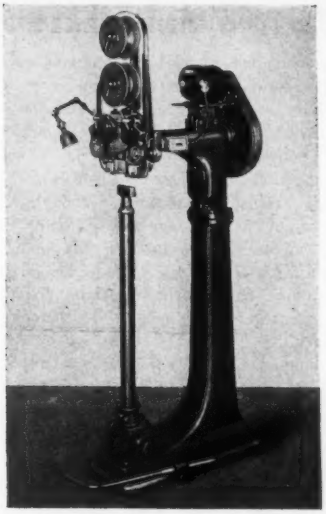
DEXTER FOLDER COMPANY
330 West 42nd Street, New York, N. Y.

BOTTOM STITCHERS



5. Bliss Heavy Duty Bottom Stitcher

Equipped with Bliss Heavy Duty stitcher head. Recommended for stitching the bottoms of regular slotted containers, and other types of one piece boxes and many other purposes, where maximum production is required.
The rugged construction of the Bliss Bottom Stitcher assures long service on heavy duty work.
Built in three sizes: 15″, 25″ or 33″ throat.



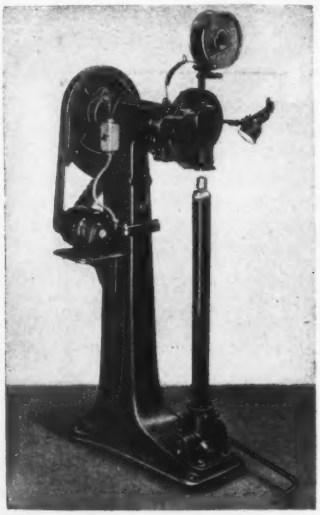
6. Bliss Heavy Duty Duplex Stitcher

Drives two stitches simultaneously, enabling a production 50% to 60% greater than is possible with the single head stitchers, without increasing the labor cost. One operator can stitch 6 to 12 boxes per minute. With two operators, production may be increased to as many as 18 boxes per minute.
Built in one size with 15″ throat length.



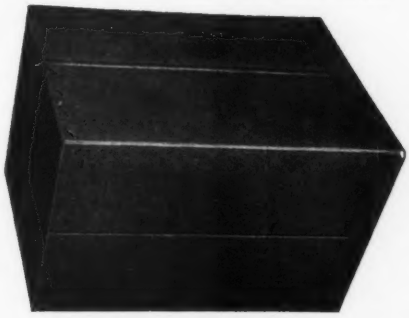
7. Bliss Box and Bottom Stitcher

This is a general purpose machine popular in plants using both regular slotted containers and various styles of telescope and Bliss boxes. Boxes can be assembled on the box arm; regular slotted containers can be bottomed stitched on post. Change can be made in one minute.
Built in two sizes, with 15″ or 25″ throat, respectively.

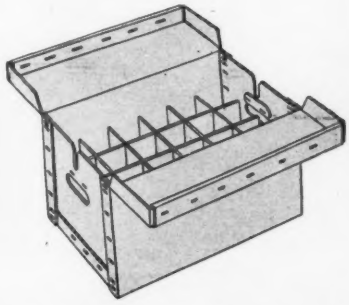


8. Improved Latham No. 34-B Bottom Stitcher

A moderately priced stitcher for bottom stitching the lighter grades of corrugated and solid fibre shipping containers in all the usual sizes. Heavy duty working parts are larger and stronger than those of previous Latham models. Formers and drivers are readily removable and reversible. Stitcher head is removable as a unit. Reliable ring type clutch.
Uses .017 or .020 ribbon wire; No. 1 or No. 2 Hybar wire. Crown of stitch, 7/16 inch. Throat, 12″. Speed up to 300 stitches per minute. ¼ HP motor.



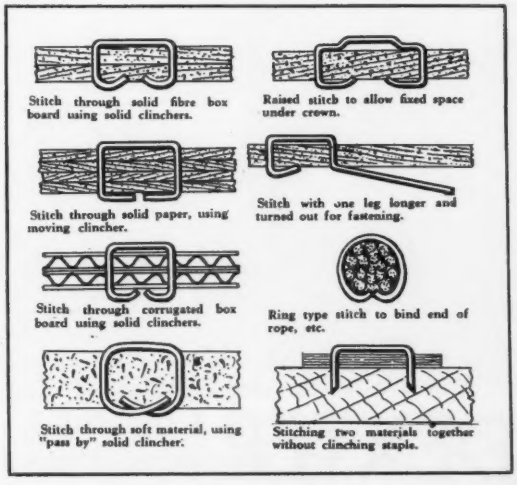
Regular Slotted Container, showing bottom stitched on Bottom Stitcher



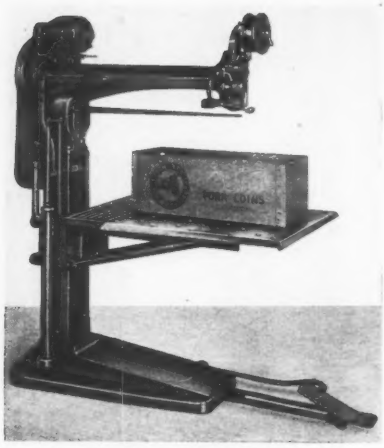
Three piece container for delivering beer and other bottled beverages. Assembled on Bliss Box Stitcher or Bliss Box and Bottom Stitcher

TYPES OF WIRE STITCHING

These are some of the types of wire stitching that come within the range of the Bliss Heavy Duty Stitcher Head. Correspondence is solicited regarding any other types of stitches your work may require.



TOP STITCHERS



9. Bliss Power Lift Top Stitcher

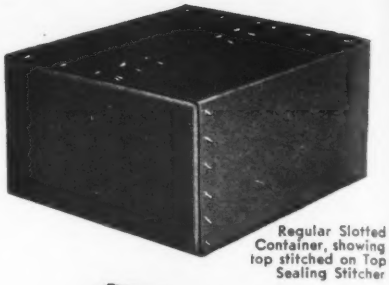
Bliss Power Lift Top Stitcher

Recommended where large numbers of heavy containers are used and is especially suitable for conveyor installations, as it is adjustable to coincide with conveyor line.

Equipped with a power driven work table. Table automatically stops in just right position for top stitching. One motor operates power lift and stitcher. A steel work table equipped with steel ball bearings permits free movement of container while being stitched.

Equipped with Bliss Heavy Duty Stitcher Head.

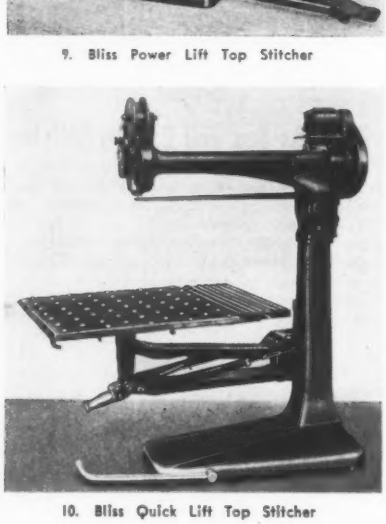
Built in one size, with 33″ throat length. Table size 26″ × 40″.



Regular Slotted Container, showing top stitched on Top Sealing Stitcher



Top Stitched with overlap in center



10. Bliss Quick Lift Top Stitcher

Bliss Quick Lift Top Stitcher

Used for wire stitching the tops of regular slotted containers and Bliss Boxes.

The steel table is supported by the Bliss quick lift mechanism which is positive in action and instantly adjustable up and down. Raising and lowering of table is facilitated by the use of counterbalancing steel springs.

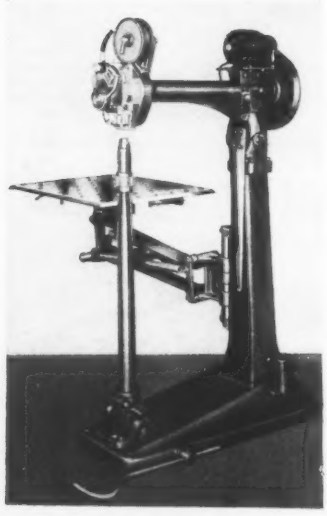
Equipped with Bliss Heavy Duty Stitcher Head.

Built in three throat lengths—15″, 25″ and 33″, accommodating boxes up to 33″ long, 33″ wide and 28″ deep.



Top stitched with overlap at side

BLISS COMBINATION TOP AND BOTTOM STITCHER



11. Bliss Top and Bottom Stitcher

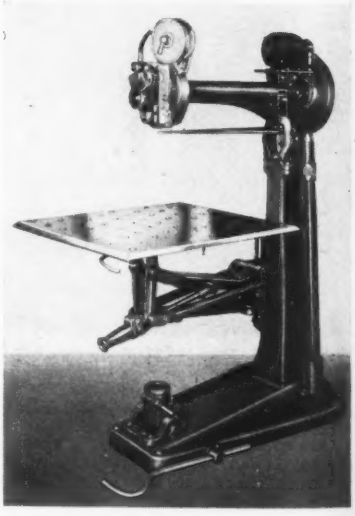
This combination machine is used both for bottom stitching and top sealing. It is intended for plants whose production does not warrant installation of separate Bottom and Top Stitchers. For assembling cases by bottom stitching, the blade anvil is dropped down against the pedestal and the table is swung to one side as illustrated in figure No. 11; the post is placed in a socket on the base and locked in position.

After the desired number of containers has been bottomed stitched, the post is removed and table and blade anvil swung into position for top stitching as illustrated in figure No. 12. Less than one minute is required to make the change.

The work table is fitted with ball bearings on which the box may be easily moved in any direction. The table is counter-balanced and is quickly and easily adjustable up or down by hand, for boxes of varying heights.

Built in two sizes with 15″ and 25″ throats, and 26″ x 30″ work table. Handles boxes up to 25″ in depth. The standard Heavy Duty Stitcher Head is used. Motor, ¼ HP.

Machine may be equipped with casters for moving about the plant.



12. Bliss Top and Bottom Stitcher

BLISS AUTOMATIC REGULAR SLOTTED CONTAINER STITCHER WITH DEXTER ELEVATOR

Regular Slotted Containers with the Manufacturer's Joint Wire Stitched are becoming increasingly popular among shippers, for the reason that Wire Stitching with the stitches driven diagonally across the corrugations makes the strongest and most rigid manufacturer's joint available. Joints of solid fibre containers are also conceded to have greater holding power when diagonally stitched, as the stitch is across the grain of the board. The entire strength of either the corrugated or solid fibre board is thus utilized.

When a container is wire stitched it remains stitched, unaffected by moisture or other unfavorable conditions in storage or transit which may often weaken seams sealed with tape. Containers treated for waterproofing, or made of specially surfaced board having poor adhesive quality, are much stronger, safer and dependable, both in storage and transit, when wire stitched.

This new low cost Bliss Regular Slotted Container Stitcher, equipped with Dexter Automatic Elevator, produces at the rate of 1,500 to 2,000 average size slotted containers per hour with one operator.

A pile of blanks up to 3½ feet in height is rolled from your conveyor system onto the elevator. As the operator folds and feeds the blanks, the elevator automatically raises and keeps the top of the pile at feeding level, thus aiding the operator in accurate high speed feeding until the entire pile is fed. The feed table is then quickly lowered, and a new pile is rolled onto the table from the roller conveyor. Better quality and uniformity of folding is obtained, as the top of the pile is always at a level most convenient for the operator. Because of uninterrupted feeding and time saved in reloading, production per hour is materially increased.

The operator folds the blank and pushes it through the open head against a stop. This action trips the solenoid which operates the clutch, and the blank is automatically fed through and stitched, with stitches evenly spaced in accordance with predetermined setting. Side guides adjustable to the size of the box blank serve as guides, thus assuring a squarely stitched container.

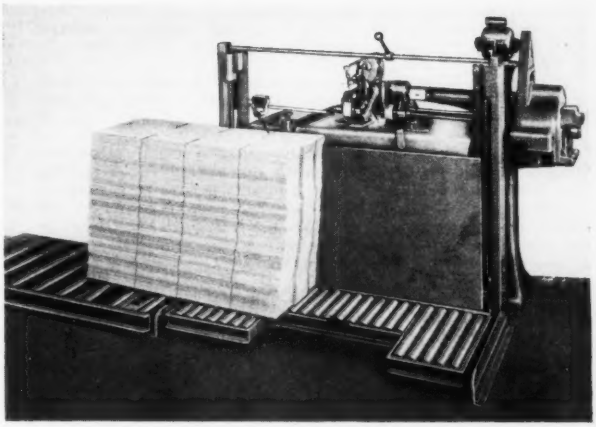
Provision is made for even spacing of stitches within a range of 1½" to 3" between stitches. Tie stitches may be driven at each end of the row of stitches, if desired. Only the number of stitches for which the machine is set will be driven.

Complete set-up for size of container and thickness of board requires approximately five minutes. This quick adjustment feature makes the Bliss Automatic practical and economical for both short and long runs. Operates at a speed of 325 stitches per minute. Stitches a wide range of sizes, representing approximately 90% of the boxes produced.

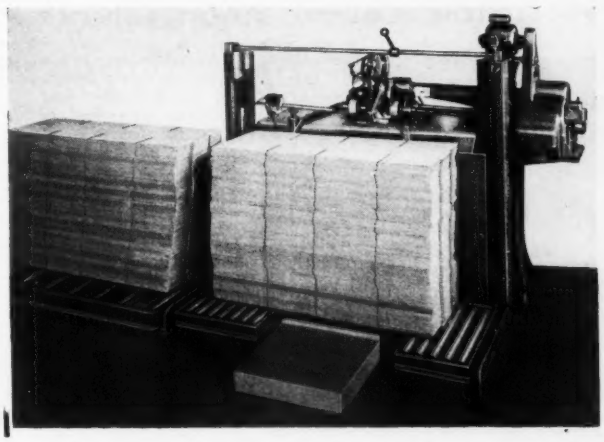
Equipped with Bliss Heavy Duty Stitcher Head with 45° Stitch. Single V-belt drive. Motor equipment, ¾ HP for stitcher and ¼ HP motor for Dexter Elevator, any electrical specifications required.



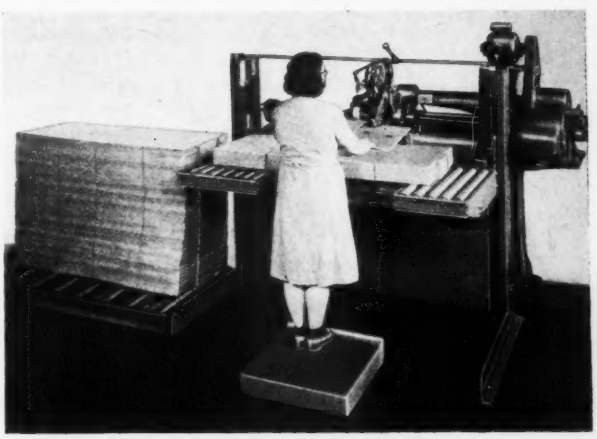
Regular Slotted Container, side stitched on RSC Stitcher



1. With Elevator lowered the pile of blanks is rolled direct from the conveyor track to the elevator roller table without lifting or handling



2. With pile in position, a pull on the lever starts the elevator. The top of the pile is brought to feeding level, and automatically stopped by the pile governor



3. As the operator folds and feeds the blanks, the elevator automatically raises, keeping the top of the pile at a convenient feeding level. When the entire pile is fed off, the elevator table is dropped quickly and smoothly to the floor, and new load is rolled on—Time, ½ minute.

BLISS DIAGONAL HEAD RSCA STITCHER

The Bliss Diagonal Head Hand Fed Regular Slotted Container Stitcher, which drives the stitch at an angle of 45° to the manufacturer's seam, is a particularly desirable machine for stitching corrugated or solid fibre containers. The stitch when placed diagonally across the corrugations makes the strongest seam available. Solid fibre containers are also stronger when diagonally stitched, as the stitch is always across the grain of the board, thus enhancing its holding strength.

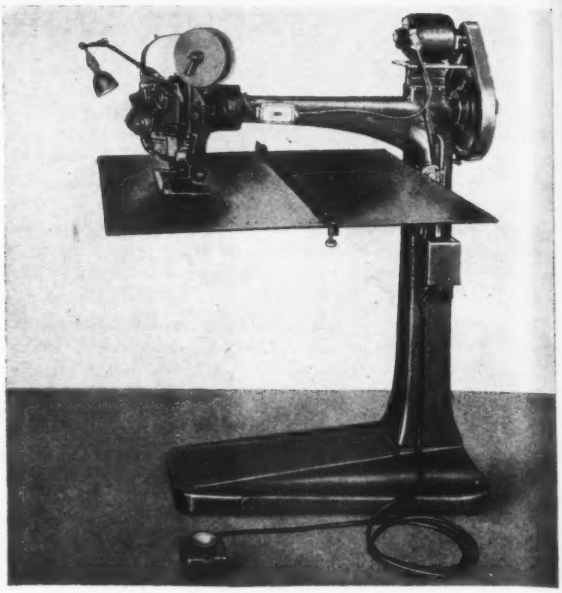
It is not uncommon to find this machine operating at speeds of 400 to 500 stitches per minute. As many as 10,000 containers with five stitches are frequently produced in a day's run.

The machine is equipped with the Bliss Heavy Duty Stitcher Head and a steel work table with quickly adjustable guides. The Bliss Open Head device for holding the flaps in position, is rigidly attached to the stitcher head casting and is therefore self-supporting. The clincher anvil does not rest on the box blank at the moment of stitching, which feature eliminates the crushing of the corrugations or denting the board.

The machine can be furnished with special clinching anvil, for stitching double wall A and B and A and A corrugated boxes. A long draw stitcher head is used.

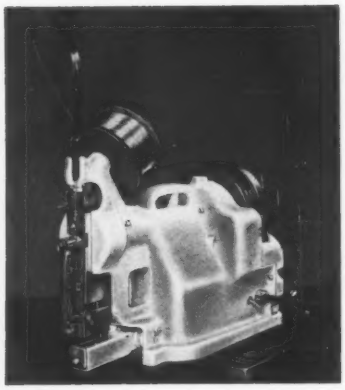
SPECIFICATIONS. Built in 32″, 38″ and 48″ throat lengths. Height to clincher, 43″.

Motor, ⅓ HP any electrical specification required.



14. Bliss RSC Stitcher (Diagonal Head)

15. BOSTON PORTABLE BENCH STITCHER



13. Bliss Portable Stitcher

With this new Boston Portable Bench Stitcher, you will often find it more convenient to take the machine to the work to be stitched rather than carry the work to the stitcher. The machine is intended for light stitching operations, such as sealing filled bags by wire stitching, attaching articles to cards, and making small boxes.

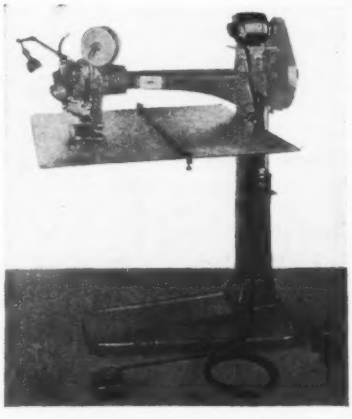
Baking companies and similar plants in the food industries use this machine extensively for sealing and stitching labels to their packaged goods.

The Portable is readily carried from one location to another, attached to light socket and put into operation without delay. It is electrically tripped by means of solenoid operated by a foot pedal or attached to stitcher arm.

Stitches work up to ¼″ in thickness and has a throat length of 4″. Uses No. 26-D Stitcher head for 25 to 30 round wire. Crown ⅜″ or ½″ as ordered. Motor, 1/20 HP.

SOLENOID CONTROL FOR STITCHERS

A recent improvement which may be applied to any type of machine except bottom stitchers is the substitution of electrical for mechanical control. In the mechanical type the clutch is engaged and released by a foot pedal mechanically connected. The electrical control employs a movable floor switch actuated by slight pressure of the operator's foot, and the clutch is engaged by the action of a solenoid mounted on the frame of the stitcher. When the foot is removed from the switch the solenoid ceases to act, and a spring releases the clutch.



15. Illustrating Solenoid Control

Among the advantages of this type of control are:

1. The switch may be placed in any desired position which is advantageous when large blanks are being stitched, or when the operator works in seated position. Can be arranged for foot or hand operation, and in some cases may be tripped by the article to be stitched.

2. The operator's foot does not have to be raised as high from the floor, and the foot pressure required is less than where manual control is employed, both of which factors reduce fatigue.

3. The operation of the clutch is more positive.

This type of control is optional on all Bliss stitchers at a small additional cost.



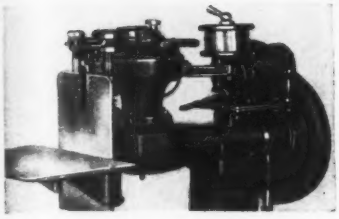
PARTS, WIRE AND MECHANICAL SERVICE

Dexter New York and Chicago Offices carry replacement parts for Bliss, Boston and Latham Wire Stitching machines, and are prepared to render prompt and efficient service on any of these makes of stitchers.

A stock of all the usual sizes of box stay and bookbinder's wire is available at all offices for prompt shipment.

Your orders for parts, service, rebuilding and wire are solicited.

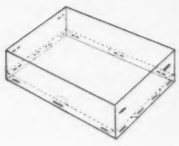
SPECIAL STITCHER ADAPTATIONS

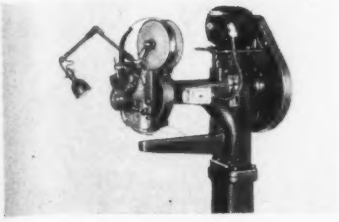


16. BLISS CADDY STITCHER

This machine, with horizontal stitcher head and moving blade unit, is used for wire stitching covers to cartons and caddy boxes that have regular top flaps. The anvil enters a pre-cut slot in the top of the cover, or it may be sharpened for cutting its own slot. Another application of this machine is for sealing telescope boxes by wire stitching.

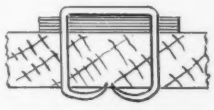
The box illustrated at the right is a popular container for merchandising citrus and other fruits. It is constructed with a recessed bottom, which is stitched in place and sealed with wire stitching on this machine, after the box is filled.

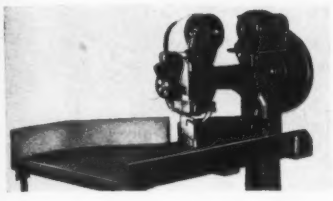




17. BLISS WOOD STITCHER

Designed for stitching materials such as wood cleated fibre boxes, plywood boxes, and for stitching other materials to wood. The stitches are fully clinched in thicknesses up to one inch when using the various kinds of soft woods.

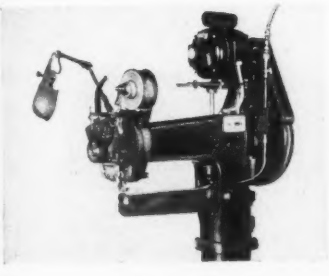




18. STOCKINETTE STITCHER

Cloth bags used in processing of smoked hams, butts and other similar products are tightly stitched at both ends with the Bliss Stockinette Stitcher. The machine drives a special stitch, circular in form, around the bag and holds the bag firmly around the meat. A knife attached to the stitcher head is provided for cutting the bag between stitches.

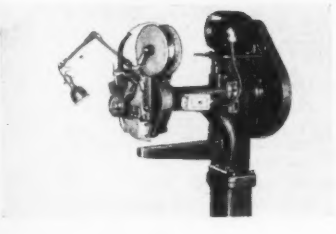




19. BLISS AIRCRAFT STITCHER

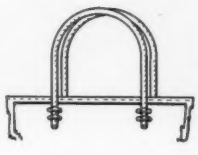
Fibre, fabrics, plastics, rubber or other materials may be wire stitched to metal with the Bliss Aircraft Stitcher. Two pieces of aluminum, steel or non-brittle metals, or two sheets of metal interlined with fabric or other soft material come within the range of wire stitching. The stitch punches a clean hole through the metal, and legs of stitch clinch flat against the metal.





20. BLISS SHOPPING BAG STITCHER

This machine is used for stitching handles to shopping bags of paper or other materials. Bag and handle are stitched with a special loop stitch as shown in drawing.





21. WIRE STITCH REMOVER

Regular slotted containers that are both bottom and top stitched, when emptied, may now be knocked down by removing the wire stitches, flattening the boxes, and returning them in bundles to the original packer.

This wire stitch remover is a handy, practical tool for quickly removing the wire stitches without breaking or tearing the board. It will materially reduce the time and cost of preparing wire stitched containers for their return trip for re-use.

DEXTER FOLDER COMPANY
330 West 42nd Street, New York, N. Y.

BLISS STITCHER HEAD

The Bliss Heavy Duty Stitcher Head is used on all types of Bliss Stitchers. It is the fastest, strongest, most durable and dependable Box Stitcher Head built. Furnished in three types—standard, long draw and extra long draw.

OPERATION. At each operation wire is fed from the spool, cut to a predetermined length, formed into a stitch and the latter driven through the material and clinched. This work is performed at speeds up to 500 operations (500 stitches) per minute.

CONSTRUCTION. Because of the heavy wire used for box stitching, and the high operating speed, only the best and most durable materials will withstand the wear and tear to which the Bliss Stitcher Head is subjected. Therefore the cutting, forming, driving and other moving parts are made of hardened tool steel which long experience has proved to be the very best for the purpose and reduces maintenance cost to a minimum.

Extra large working surfaces of cams, long bearing surfaces for former slides, specially hardened knives which can be reground many times, and numerous other engineering features, all contribute to the successful operation and long service of the Bliss Stitcher Head.

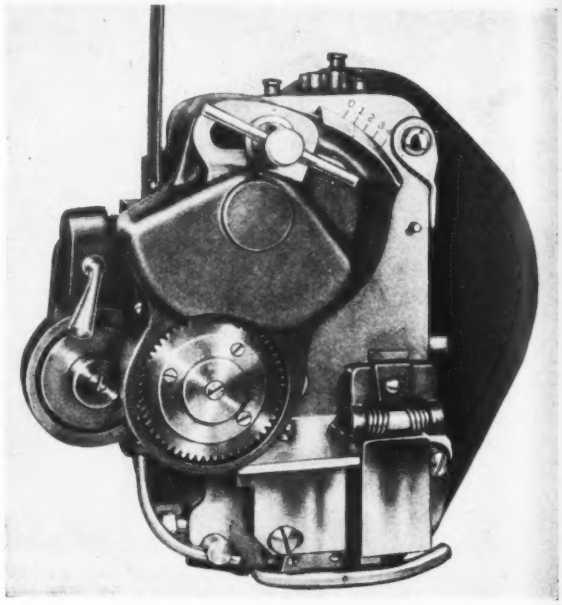
The head is easily detachable for service. The wide clearance of 1⅝" between clincher head and anvil facilitates insertion of heavy work and aids visibility at point of stitching.

SPECIFICATIONS. One adjustment changes the length of wire drawn for varying thicknesses of stock to be stitched.

Interchangeable parts may be furnished for driving the various sizes of wire, including ribbon, highbar and other flat or round sizes.

Standard widths of crown, ⅜" and 7/16". The head may also be equipped to drive stitches of ¼", ½", 9/16", ¾", 1⅛" and 1⅜".

A special sharp stitch cutting block may be furnished.



22. Bliss Heavy Duty Stitcher Head

TYPES OF BLISS BOXES



No. 2 Bliss Box—Sealed

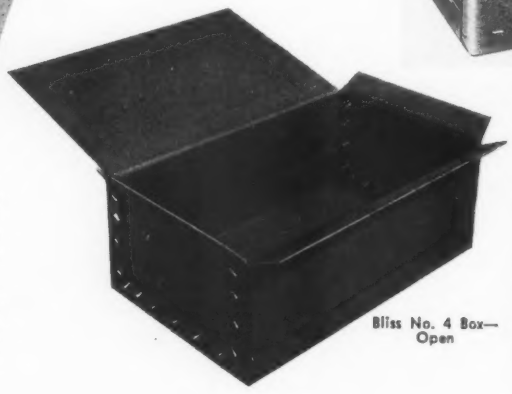
When No. 2 Box is assembled, the flanges form a double thickness of board on all vertical seams on the sides, and on horizontal seams at each end of the box.

Blanks for Bliss Boxes are readily obtainable from leading board mills and box factories in the United States and Canada. Assembled and sealed on Bliss Stitchers.

The Strongest Corrugated or Solid Fibre Containers obtainable.

When No. 4 box is assembled the three flanges form a double thickness on the ends, which gives added protection for canned goods and other commodities where an end thrust of the contents is to be guarded against.





Bliss No. 4 Box—Open

This New Bliss Wire-Lock Seal Box may be sealed, opened for inspection and re-sealed without damage to the box.

Wire stitches with arched crown attached to top panel and body of box provide means for locking the cover with wire or strips of metal which may be sealed with lead seals. Such seals are readily broken without damage to the box and after inspection or repacking new seals may be applied. This box, with arched wire seals attached, is manufactured by leading container companies.

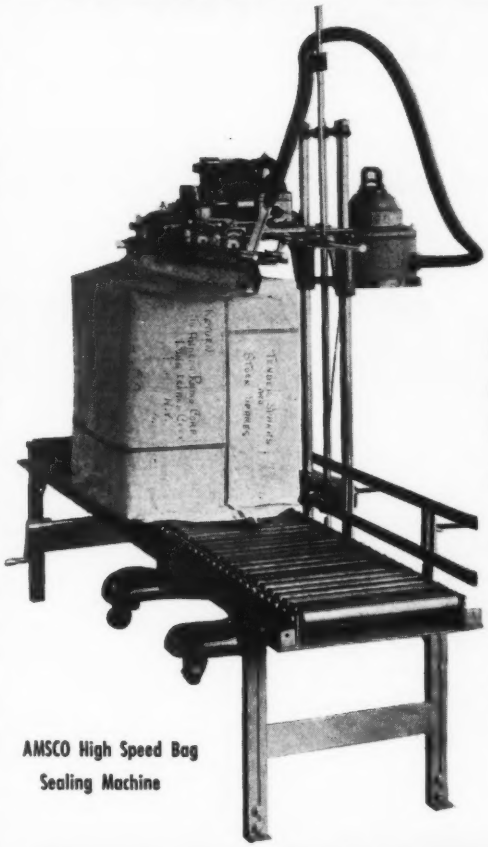
DEXTER FOLDER COMPANY

330 WEST 42nd STREET NEW YORK, N. Y.

AMSCO

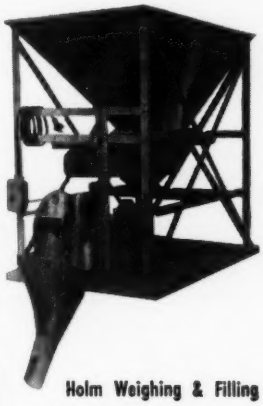
FOR YOUR PACKAGING MACHINERY REQUIREMENTS

For greater efficiency, speed and economy, AMSCO offers machinery to perform the following operations.



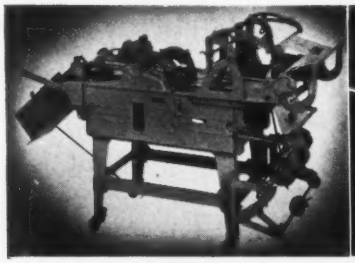
AMSCO High Speed Bag Sealing Machine

1. Wrapping
2. Sheeting and gluing
3. Bag making
4. Bag and carton weighing and filling
5. Bag sealing, large and small
6. Sandwich making and wrapping
7. Hand and foot operated sealing devices — hot plates and sealers

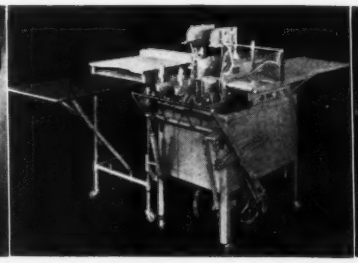


Holm Weighing & Filling Machine

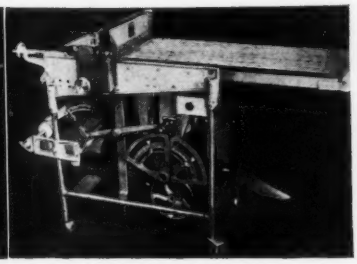
Literature available



Simplex Bag Making Machine



Miller Wrapping & Sealing Machine



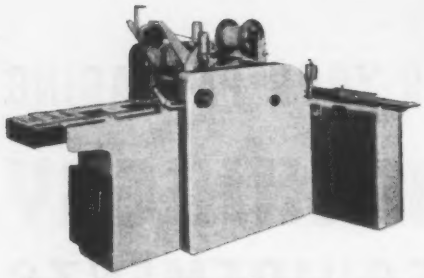
Corley-Miller Sheeter-Gluer

AMSCO PACKAGING MACHINERY, INC.

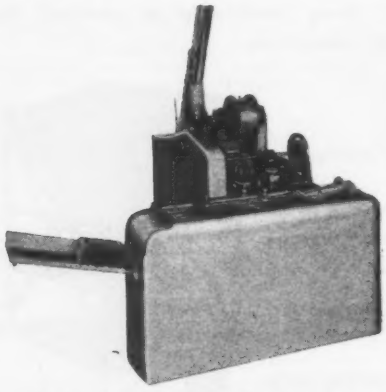
31-31 Forty-Eighth Ave., Long Island City 1, N. Y. • STillwell 4-4840

Represented in Mid-West — Miller Wrapping & Sealing Machine Co., Chicago 6, Ill.

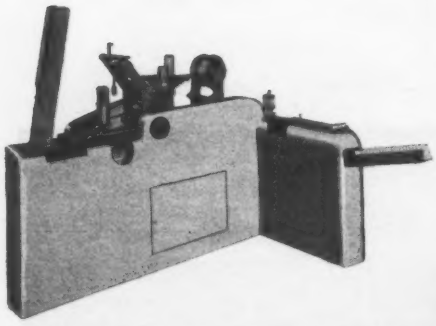
Represented on Pacific Coast — Simplex Wrapping Co., Oakland 6, Calif.



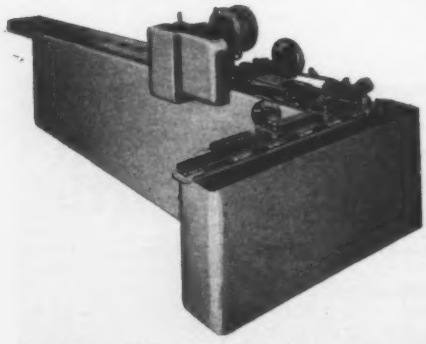
Scandia Fully Automatic Cello-wrapping machine equipped with electric eye for registering printed wraps, and tear-tape attachment.



Scandia Fully Automatic Cello-wrapping unit for general merchandise. Widely used by Tobacco Manufacturers, speed, up to 250 per minute.



Scandia Special Fully Automatic Cello-wrapping machine equipped for applying Revenue or Union Stamps and Tear-Tape.



Scandia Fully Automatic Cello-wrapping machine with long conveyor; Speed, up to 250 per minute.

perfect—trouble-free

Cello-wrapping

on Scandia units

up to 250 per min.

Standard Units for Standard Packs with or without Special Attachments

FOR SEALING MOISTURE IN, or keeping moisture *out*, speed, and smooth, quiet mechanical operation that does a perfect job—day in and day out—for years of economical production, SCANDIA provides features that appeal to hard-headed, volume producers. That's because Scandia units are *designed* for straightaway, rythmic performance, easy to feed, easy to adjust.

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Watch a **Scandia** *work—and you'll want* SCANDIA *performance!*

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have a 48-year record of packaging jobs well done for practically every type of product



CARTONING MACHINES

• *Consult Redington* for automatic cartoning of practically any solid item. Machines are available for inserting bottles, jars, collapsible tubes, razor blades, candy coated gum, oleomargarine, macaroni, soap and *almost any other* solid item or container in glued-end or tuck-end cartons. *Redington* Cartoning Machines can be equipped with circular mechanism for automatically handling printed advertising matter —means for code stamping carton —means for printing on cartons— mechanism for other features such as placing a corrugated protector around bottles.

WRAPPING and CELLOPHANE WRAPPING

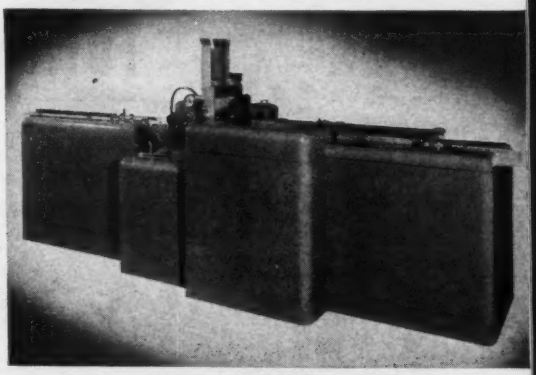
• *Consult Redington* for high speed wrapping machines for handling products in Cellophane, Sylphrap, wax or glassine paper and *other wrapping materials.* Redington Wrapping Machines can be equipped with mechanism for applying "Easy Opening Tape"—with photoelectric cell mechanism for controlling cut-off of printed design—with special mechanism for handling government stamps for tobacco packages, and with many other special mechanisms.

Combination CARTONING and WRAPPING

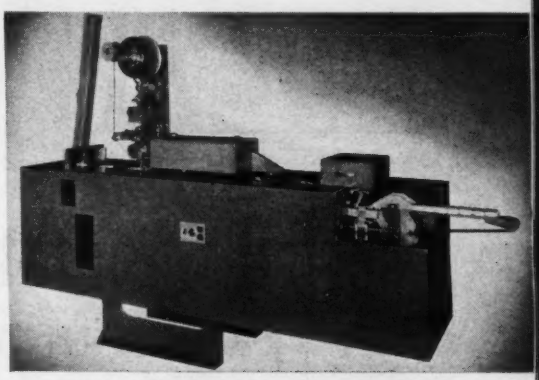
• *Consult Redington* for machines for such items as the new Schick Injector package, candy coated gum and other packages where it is advisable to carton and wrap on the *same* machine. Photoelectric cell mechanism for registering printed wrapping material, and easy opening tape mechanism are available.

SPECIAL PACKAGING

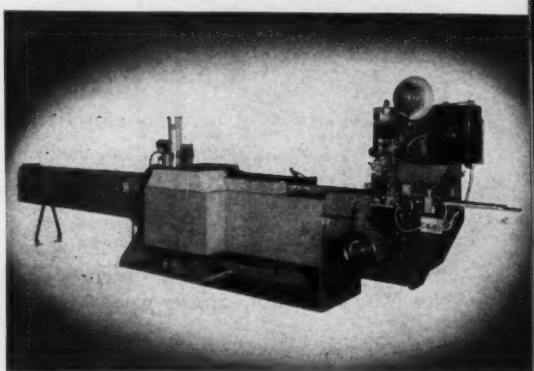
• *Consult Redington* for packaging machines that defy classification . . . the unique wrap of Listerine, the double wrap for Crystal White Soap, the interlocking wrap for tins of Underwood's Deviled Ham, the Phillips Milk of Magnesia package, Bayer's tins of Aspirin, Life Savers, professional and sample envelopes for Bayer's Aspirin and Grove's Laxative Bromo Quinine.



Type 23 Continuous Loading Cartoning Machine for handling Fitch's Ideal Hair Tonic. Same type machine built for items shown at the left, as well as for many other products.

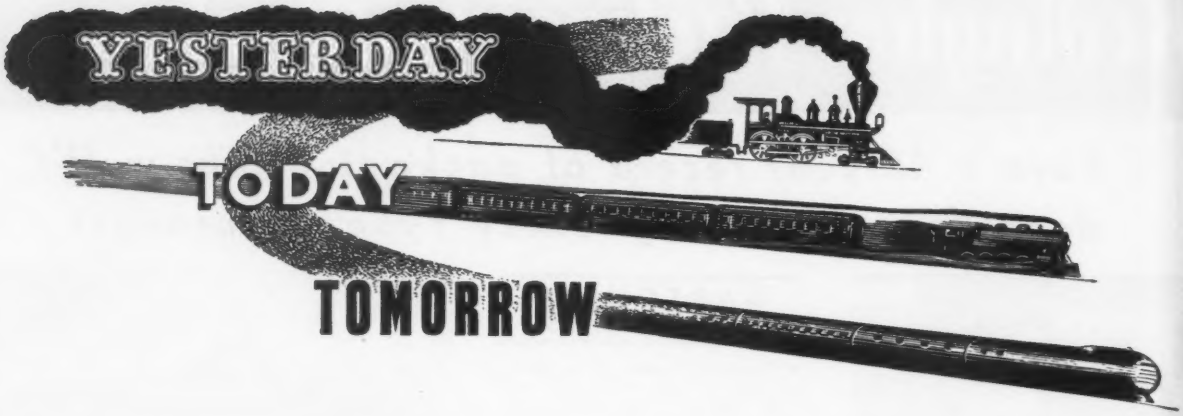


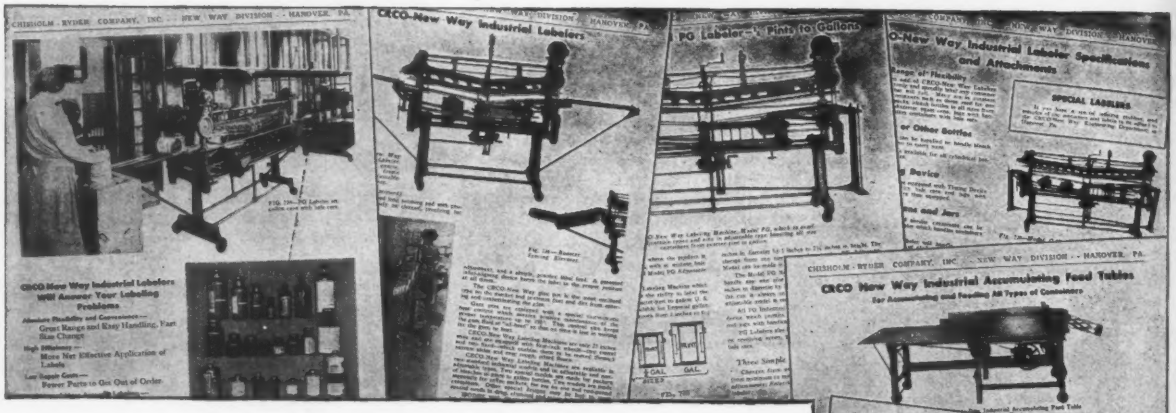
Type 96 high speed Cellophane Wrapping Machine with means for applying Easy Opening Tape. Machine shown was built for wrapping cigarette packages. Available for high speed wrapping of similar items.



Type 23 Continuous Loading Cartoning Machine combined with Cellophane Wrapping attachment. This combination unit not only inserts article into carton but also wraps closed carton in Cellophane.

F. B. REDINGTON CO. (Established in 1897) 108 So. Sangamon St., CHICAGO 7, ILL.





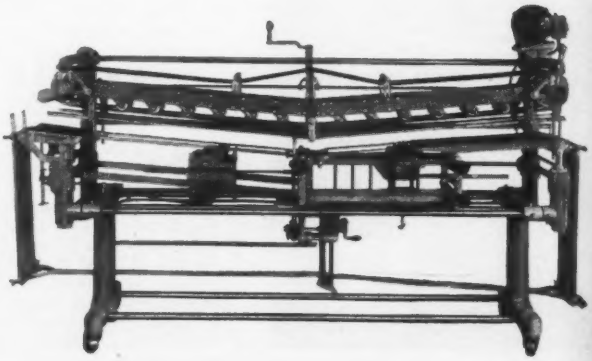
America's Versatile Labeler

By CRCO-NEW WAY

The one Labeling Machine that stands the test of years of continuous service—the CRCO-New Way Labeler which will handle any type of container that will roll—including tall bleach bottles, gallon jugs, gallon cans with bale ears—affixing all-around or spot labels.

The CRCO-New Way quick changeover feature permits a wide range, from 1¾" to 6 11/16" in diameter by 1¾" to 9" in height. Only a few minutes needed for complete changeover.

Send for special booklet giving complete details of CRCO-New Way equipment. Specify type of industry.



•

CHISHOLM-RYDER COMPANY

NEW WAY DIVISION HANOVER, PENNA.

SEYBOLD *Morrison*

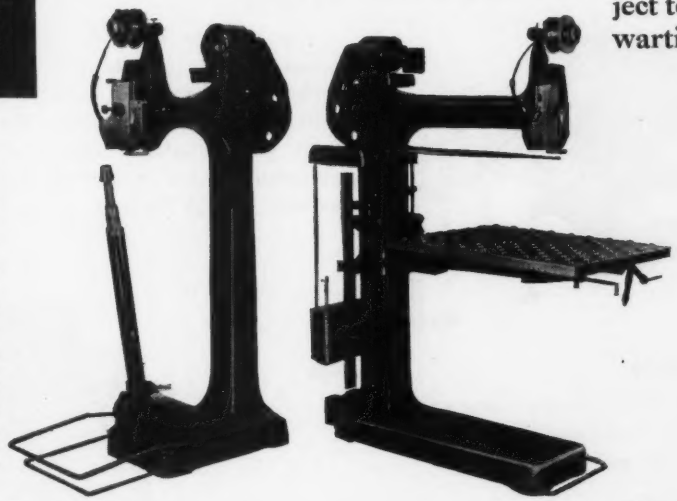
WIRE STITCHING MACHINES



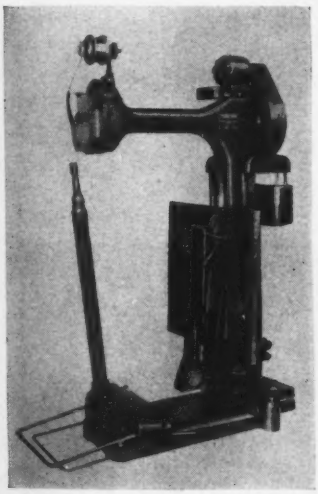
BOTTOM STITCHING

(Above) Bottom stitching corrugated containers on the SEYBOLD *Morrison Wire Stitching Machine* illustrated at right. Designed in two models: Model SLH with 15" throat and Model SLJ with 25" throat. Where required, an arm can be installed to make the machine a combination "Arm and Bottomer."

Assembling and sealing corrugated and solid fibre containers with SEYBOLD *Morrison Wire Stitching Machines* speed packaging operations and reduce packaging costs appreciably in comparison with other methods. These heavy duty machines are equipped with the exclusive and patented Type-SL Stitcher Head. Complete information will be furnished promptly but actual shipments are subject to U. S. Government wartime regulations.



Morrison Wire Stitching Machines are designed in two models: Model SLM with 25" throat and Model SLP with 33" throat. Equipped with blade anvil arm and quickly adjustable roller top table, as illustrated.



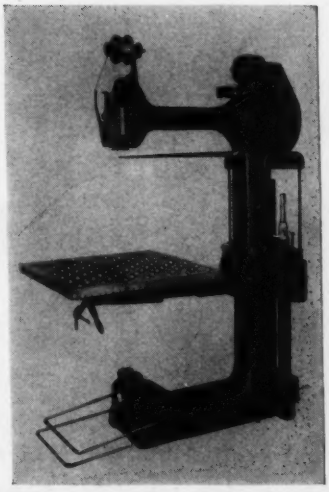
COMBINATION TOP AND BOTTOM SEALER

(At left) SEYBOLD *Morrison Combination Top and Bottom Stitching Machine* set up for bottom stitching with blade anvil folded down, counterbalanced roller top table up, and clincher post in position.

(At right) The same machine set up for top sealing. This type of unit is designed in two models: Model SLQ with 25" throat and Model SLR with 33" throat.

OTHER TYPES OF MORRISON STITCHERS

The complete line of SEYBOLD *Morrison Wire Stitching Machines* includes 15 standard models of bottom stitchers, top sealers, combination units, side seamers, and arm machines in a wide range of sizes and practical throat depths to meet practically all standard requirements.



SEYBOLD DIVISION

Harris • Seybold • Potter Co. • *858 Washington Street, Dayton, Ohio*

SEYBOLD SALES AND SERVICE

New York:
E. P. Lawson Co., Inc.
426 West 33rd Street

Detroit, Michigan
Harris-Seybold-Potter Co.
5301 Grand River Ave.

West Coast Distributor:
Harry W. Brintnall, Inc.
San Francisco, Los Angeles, Seattle

Chicago:
Harris-Seybold-Potter Co.
112 West Harrison Street

Southern Sales District:
Harris-Seybold-Potter Co.
220 Luckie St., N.W., Atlanta, Ga.

Latin America:
National Paper & Type Co., Inc.
120 Wall St., New York, N. Y.

Canadian Distributors:
Harris-Seybold-Potter (Canada) Ltd.
Toronto and Montreal

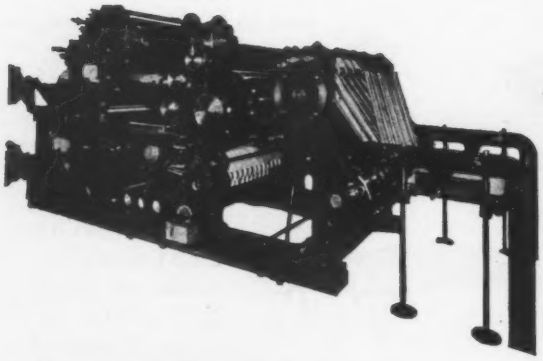
MEISEL

PRESSES SLITTERS SHEET CUTTERS

MEISEL

Reg. U.S. Patent Office

MACHINES FOR LAMINATING LABEL DIEING

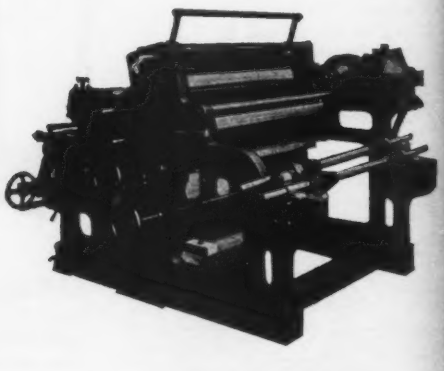


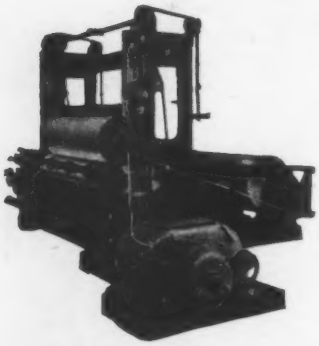
PRESSES

We build both rotary and bed and platen printing presses. These presses print from typographical plates both metal and rubber as also by offset and rotogravure systems. The multioperation rotary presses are built as fixed size, adjustable, all-size, and variable. These are patented. Several operations can be performed in one passage through the press.

LAMINATING MACHINES

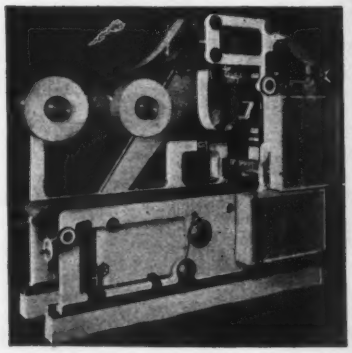
The laminating machines we build vary in size and weight to suit the materials to be combined. Hot asphalt as well as liquid adhesives and latex are used.





SLITTERS

Our models of slitters range from small to large and use the type of cut suitable for the material to be converted. Unwinds, rewinds, and drives vary to suit the models.



SHEET CUTTERS AND LABEL DIEING

The cutting of paper into sheets or into variformed outlines is done by an assorted group of machinery. Some do the cutting in connection with other operations. Maximum accuracy is maintained.

MEISEL PRESS MFG. CO.

944 DORCESTER AVE. BOSTON, MASS.

Sheet Plastic Fabrication



R-70 PLASTIC EDGER



RECTANGULAR SIDING



SPECIAL SHAPES

LARGE CYLINDERS

Taber SHEET PLASTIC FABRICATING MACHINES

FEATURES

- A MODERN, PRECISION TOOL BACKED BY 22 YEARS EXPERIENCE WITH SHEET PLASTIC
- CLEAN, ECONOMICAL ELECTRIC HEAT
- BUILT-IN DIAL THERMOMETER
- ACCURATE THERMOSTATIC HEAT CONTROL

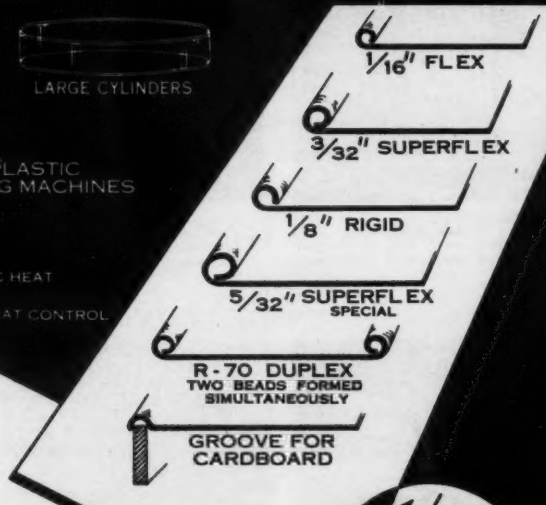
OTHER PRECISION-BUILT PLASTIC MACHINES

THERMODRAW
PRESSES FOR DRAWING SEAMLESS ROUND COVERS AND BODIES.

THERMOCURL
CYLINDER AND CAP BEADING MACHINES. BOTH HAND AND AUTOMATIC TYPES.

THERMOFOLD
FOLDING MACHINES FOR LINE FOLDING AND CREASING.

ALSO COMPLETE MANUFACTURING INSTALLATIONS



Taber INSTRUMENT CORP.

NORTH TONAWANDA, NEW YORK

Write FOR R-70 EDGER BULLETIN 4201

LAMSON CORPORATION

1003 Lamson St., Syracuse 1, N. Y.

Manufacturers of Conveyor Systems and Pneumatic Dispatch Tubes

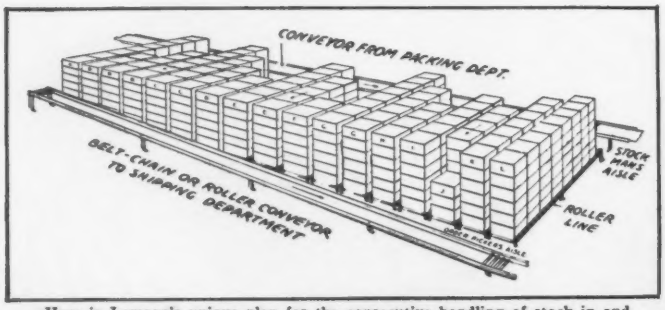
Boston	Baltimore	Detroit	Dallas
New York	Washington	Cincinnati	San Francisco
Cheshire, Conn.	Atlanta	Chicago	Los Angeles
Philadelphia	Cleveland	St. Louis	Seattle



Straight-line production in Strietmann Biscuit Company's new plant. Two main line belts are shown bringing double lines of cartons through closers.

Lamson Conveyors and Lamson Dispatch Tubes are the tools which modern plants are using to (1) reduce human handling with the resulting speed-up in production; (2) to hold costs to a profitable level. Each system coordinates with the other toward a planned result. Conveyors speed up materials and processes; dispatch tubes speed up methods and paper work.

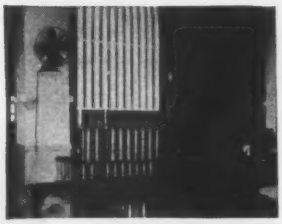
Complete Engineering Service—Lamson Corporation not only supplies a complete line of package conveyors but also has an engineering department experienced in the application of Lamson equipment to package handling problems. Factory trained resident engineers are always available for free consultation.



Here is Lamson's unique plan for the consecutive handling of stock in and out of storage. Order pickers need not hunt for stock—it moves to them as they require it.



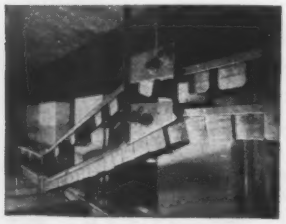
Where the Tube Carrier goes is shown by this indicating ring which is set by the person sending it.



Dispatch Tubes save time and thousands of steps daily for Butler Bros., large wholesalers of Minneapolis.



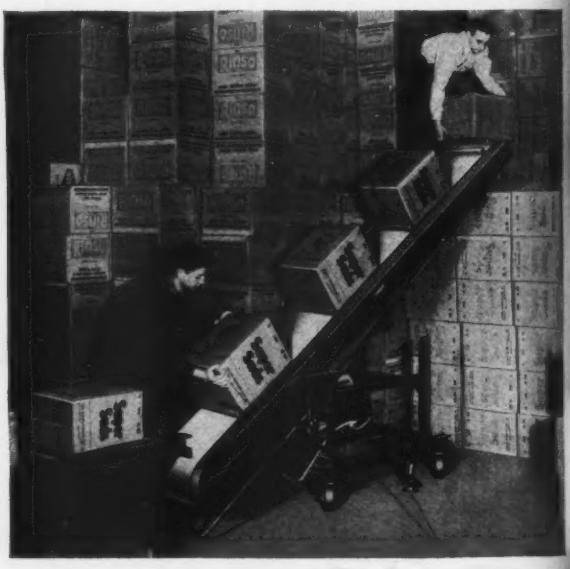
Cartons move at a handy working level over this live-roll switching conveyor at General Mills.



Two-way Belt Conveyor at Ontario Biscuit plant. Top belt brings empty caddies from floor above. Lower belt takes filled caddies to shipping or storage.



Merchandise orders are assembled by trucks hauled by an Overhead Conveyor in this Atlantic and Pacific Tea Company's warehouse.



Available to Dealers—This new Utility Conveyor . . . portable, adjustable, reversible . . . is a packaged conveyor unit that needs only to be plugged into your electric light circuit.

Announcing

CONSOLIDATED

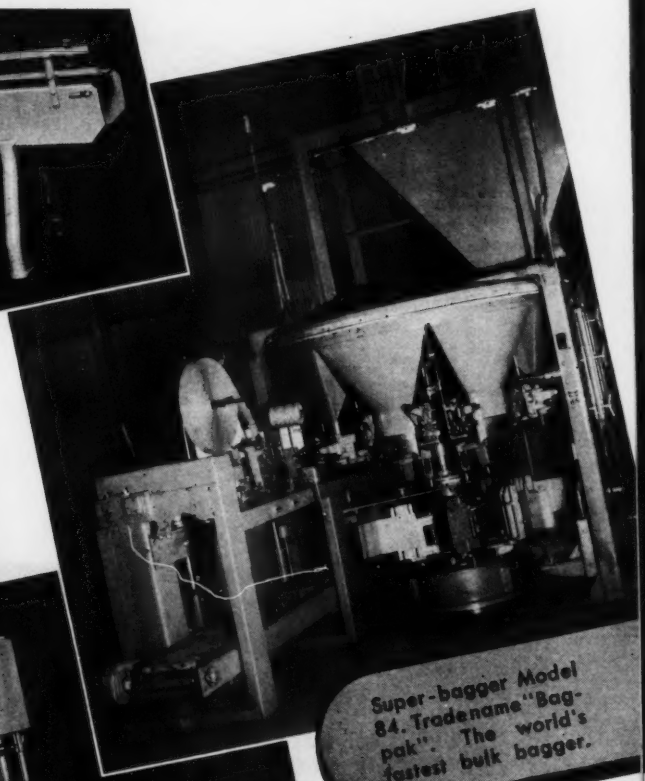
POSTWAR POLICY!

Our present planning gives effect to a new Consolidated policy—that of offering fewer types of equipment—but with the definite objective of making each type the unchallenged best in the field. By so concentrating our experience and facilities we are confident that when you specify CONSOLIDATED, CAPEM, HOEPNER, SEALTITE or BAGPAK you will be purchasing the absolute best by every important standard of comparison.



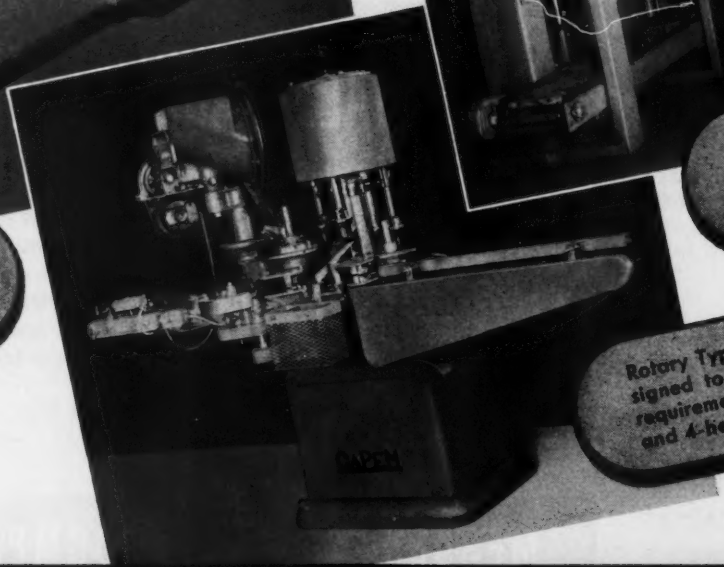
"Hoepner" Multiple Head Weighing Unit with settling device and package control.





Super-bagger Model 84. Tradename "Bagpak". The world's fastest bulk bagger.

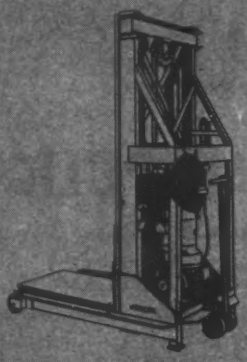
litite "Synchromatic" 1945 matic Bag Feeder, Scales, ller, Sealer and Drier for lb. to 10 lb. paper bags.



Rotary Type C-4-F CaPeM. Redesigned to meet every production requirement. Offered in 1, 2, 3 and 4-head types.

CONSOLIDATED PACKAGING MACHINERY CORP.

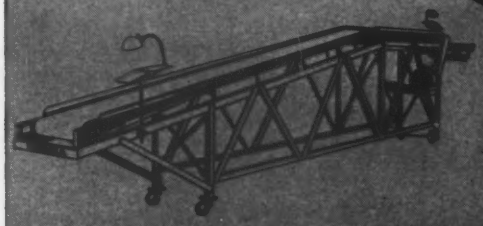
BUFFALO, N. Y.



TELESCOPIC
& PLATFORM
ELEVATORS

MERCER

THE LIFT THAT LESSENS WORK
SPEEDS HANDLING — AND LOWERS COSTS!



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CONVEYORS



STACKERS
HOISTING UNITS
FORK LIFT TRUCKS
HAND LIFT TRUCKS
DUMP CARTS
TRACTOR CRANES
LIFT JACKS
LIVE & SEMI-LIVE
SKIDS



Mercer Lift Jack . . . Quick
low cost way to convert semi-
live skids into live pull trucks

MATERIALS HANDLING EQUIPMENT

● In practically every industry—packaging being no exception—you will find Mercer Handling Equipment speeding up the movement of materials . . . at a saving to labor . . . at a saving in costs! Send for illustrated literature. If the varied types shown do not solve your problem, Mercer will design, engineer and construct it for you! Inquiries invited.

● MERCER ENGINEERING WORKS, INC.
WORKS: CLIFTON (ALLWOOD) NEW JERSEY



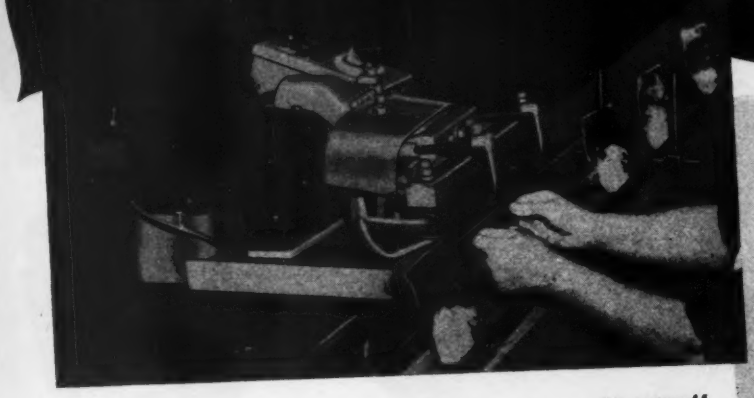
TRAILER TRUCKS
WHEELS & CASTERS
DOLLIES
DEAD SKIDS
ETC.

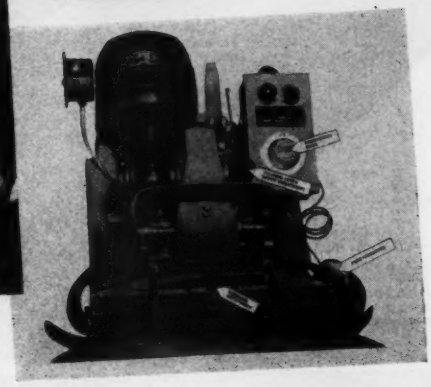
MERCER-ROBINSON COMPANY, INC.

SOLE SALES REPRESENTATIVES

30 CHURCH STREET, NEW YORK 7, N. Y.

SEALTIGHT THE ORIGINAL "HEAT" BAG SEALING MACHINE





"PACER" MODEL

SEALTIGHT OFFERS THESE IMPORTANT ADVANTAGES

(1) AN AUTOMATIC FOLDING MECHANISM neatly and uniformly folds the top of the bag at the same time that the seal is applied.

(2) THERMOSTATIC HEAT CONTROL of the most efficient hydraulic type assure correct constant temperature at all times for any material.

(3) DATE CODING ATTACHMENT embosses a coded date right in the seal while the seal is being applied . . . can be quickly changed.

(4) HOLE PUNCHING ATTACHMENT punches a round, clean hole at the same instant that the crimp jaws apply the seal to the package.

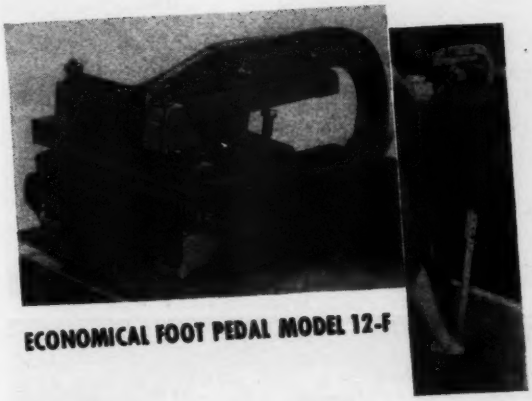
(5) SPECIAL MODEL FOR LARGE, BULKY BAGS that are ordinarily difficult to get close to the machine.

(6) MAXIMUM VERSATILITY allows for the use of any type of heat sealing bag material. Adjustments are simple to make.

(7) PRECISE, STURDY CONSTRUCTION provides long life and maximum efficiency with a minimum of cost for maintenance or repairs.

(8) 12 YEARS OF EXPERIENCE exclusively in the production of crimp heat sealing machines.

Originators of this most economical and efficient way of sealing bags. The HEAT SEAL-IT COMPANY has maintained its leadership by constant research and improvement of its models. Users of SEALTIGHT equipment include many of the country's largest industrial Plants, in addition to leading food, drug and confectionery companies.



ECONOMICAL FOOT PEDAL MODEL 12-F

The fastest, sturdiest machine of its type, Model 12-F is especially useful where the volume of work does not warrant use of the motor driven "Pacer" Model.

KICK-LEG FOOT LEVER applies 10 times the pressure exerted by the foot, requiring less effort.

UPPER JAW IS FLOATED ON SPRINGS, assuring perfect alignment and cushioning the jaws against shock.

AVAILABLE FOR IMMEDIATE DELIVERY

Let Our Engineers Help You Solve Your Problem. WRITE FOR OUR CATALOG! NO OBLIGATION!

HEAT SEAL-IT COMPANY

4316 LANCASTER AVE., PHILADELPHIA 4, PA.



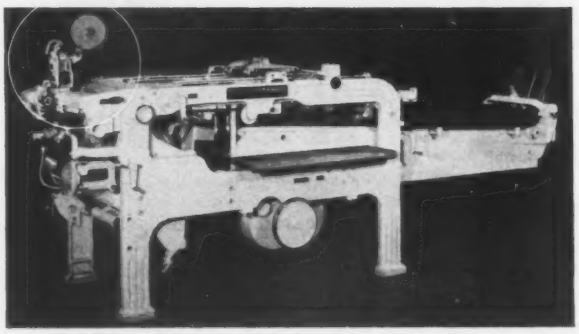
"OLIVER" Roll-Type THERMOPLASTIC LABELLING SYSTEM



"Oliver" Roll-Type Labels are designed by our own artists, produced by our own craftsmen in our own modern printing plant.

Used with the "OLIVER" LABELLING ATTACHMENT





The "Oliver" Labeller is a complete unit in itself. It can be used as an individual machine for labelling only, or it can be attached to most types of wrapping machines.

This NEW System reduces labelling costs and speeds production

Colorful diecut labels *from rolls* are heat-sealed to your packages with the patented "Oliver" Roll-Type Labeller. Rolls of labels are low in cost, easy to stock, and can be changed without fuss or waste. Electric heat-sealing does away with the use of expensive liquid glues.

The "Oliver" Labeller automatically heat-seals one label at a time in almost any desired position on the package. Can be applied to any type of wrapping material—cellophane, glassine, paper, etc. The diecut labels are attached end-to-end, and are separated by an accurately timed cut-off knife just before application. If desired, the automatic "Oliver" Coder neatly prints your code on the label.

Today hundreds of leading manufacturers and food processors are using the "Oliver" Labelling System at great savings. Investigate what this new system can do for you.



A girl can operate an "Oliver"

"OLIVER" AUTOMATIC WRAPPING MACHINE

Most versatile, easy to adjust

Wraps cakes, fresh vegetables, fresh fruits, dried fruits, meats, cheese, frozen foods, textiles, candy bars, paper napkins, etc.—in cartons, trays, U-boards, flat cards, or without supports.

Handles widest range of sizes

Handles rectangular- and irregular-shaped articles. Quick, simple adjustability, plus wide range of sizes, make this machine easily adaptable to your particular needs for production and variety. Changes from "underfold" to "endfold" at the flick of your finger. Neat folds and a strong seal that excludes or retains moisture. Fully adjustable wrapper tension. Self-centering paper rolls. Automatic paper stop. In circle, Automatic Labeller. All operations electrically synchronized.

Automatic Cardboard Folder and Feeder

For Complete Information Write to the

PACKAGING DIVISION
OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICHIGAN

BOX MAKING & PACKAGING MACHINERY



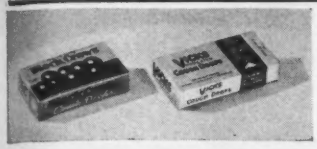
"SCOTT" NET WEIGHERS

For weighing and filling coffee, rice, peas, tapioca, spices, tea, soap flakes, crackers, etc. Speeds up to 45 per minute are obtained with one operator, and closest accuracy is maintained.



"BOND" POWDER FILLING MACHINES

Automatic or semi-automatic models for packing, gross weighing, or volume filling. For face powder, talcum, flour, soap powder, tooth powder, cocoa, etc., and paste materials. Speeds up to 120 per minute are obtained.



"MODEL C-10" CANDY & COUGH DROP PACKAGING MACHINE

Automatically opens flat carton, tucks bottom, cuts liner from roll, forms and inserts liner, counts and inserts candy, then tucks in and closes liner and top flaps of carton. Liner can be omitted when desired. Speed 60-100 per minute.



"MODEL C-21" HIGH SPEED CARTONING MACHINE

For samples and penny candy. Two magazines feed flat cartons to the opener, bottoms are tucked, and both are filled simultaneously, then the tops are tucked. Machine can be equipped for lining or wrapping or both. Speed—150 per minute.



"MODEL W-18-1" PACKET FORMING & FILLING MACHINE

Printed foil or laminated paper roll is registered automatically, cut off, folded, heat sealed on sides, filled with powder; then top is folded and heat sealed. Speed is 60 per minute.



"MODELS C-2, C-20 & W-16" FOR WRAPPING & CARTONING RAZOR BLADES

C-2 Cartoner opens flat cartons, tucks in bottom, counts and inserts single edge blades and closes at 125 cartons per minute. C-20 Cartoner does same operations on double edge blades. W-16 Wrapper wraps and glues labels on single edge blades at 175 blades per minute.



UNIVERSAL "BRIGHTWOOD" BOX MACHINE

Fully automatic for making a wide range of different sizes of boxes at lowest production costs. It forms and glues turned-over end boxes from creased or scored blanks with or without double side walls, in addition to standard single end boxes, at speeds up to 70 per minute.



STANDARD "BRIGHTWOOD" BOX MACHINE

The Standard "BRIGHTWOOD" automatically glues and forms single wall boxes in a wide range of sizes and styles, such as two-piece with shallow or full telescope cover, one-piece hinge-cover, trays, etc. at speeds up to 60 per minute.

The boxes, containers, cartons, etc., shown above, merely illustrate some of the various types of packaging which are accomplished on U. S. Automatic machinery. Our files contain hundreds of such items—among these are packages like your own—this is the reason it is wise to come to U. S. first with packaging problems.

Send U.S. details on any of your packaging problems—we have the machines and the engineering background to help solve them.

US *Automatic Box Machinery Co. Inc.*

Owning and Operating

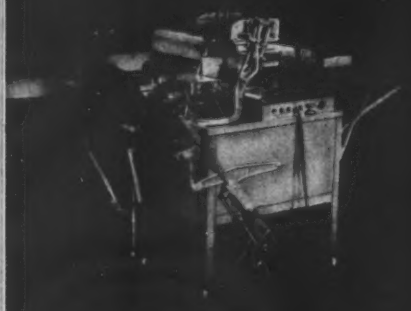
NATIONAL PACKAGING MACHINERY CO. • CARTONING MACHINERY CORP.

18 ARBORETUM ROAD, ROSLINDALE, BOSTON 31, MASS.

Branch Offices: NEW YORK CLEVELAND CHICAGO
LOS ANGELES (KRUGH EQUIPMENT & SUPPLY CO.)

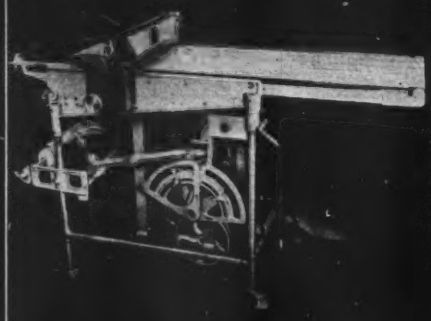
Machines for...

WRAPPING



MILLER MODEL MPS
WRAPPING MACHINE

SHEETING-GLUING



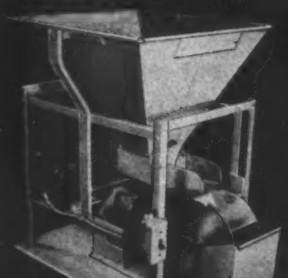
CORLEY MILLER "SPEED WRAP"
PAPER SHEETING AND GLUING MACHINE

BAG MAKING



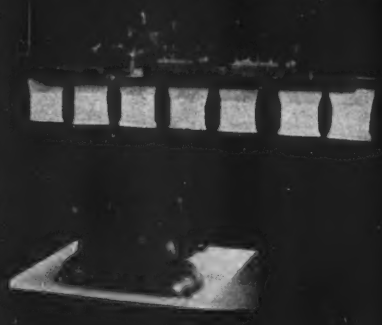
SIMPLEX HIGH SPEED AUTO
MATIC BAG MAKING MACHINE

FILLING



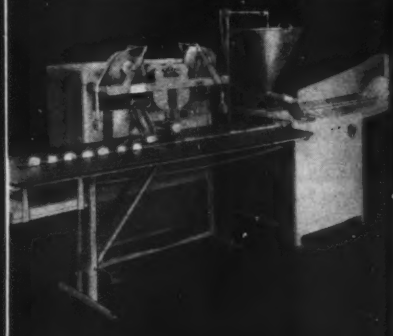
HOLM MODEL A-AH WEIGHING
AND FILLING MACHINE

ROTARY SEALING



AMSCO HIGH SPEED ROTARY
BAG SEALING MACHINE

SANDWICH MAKING



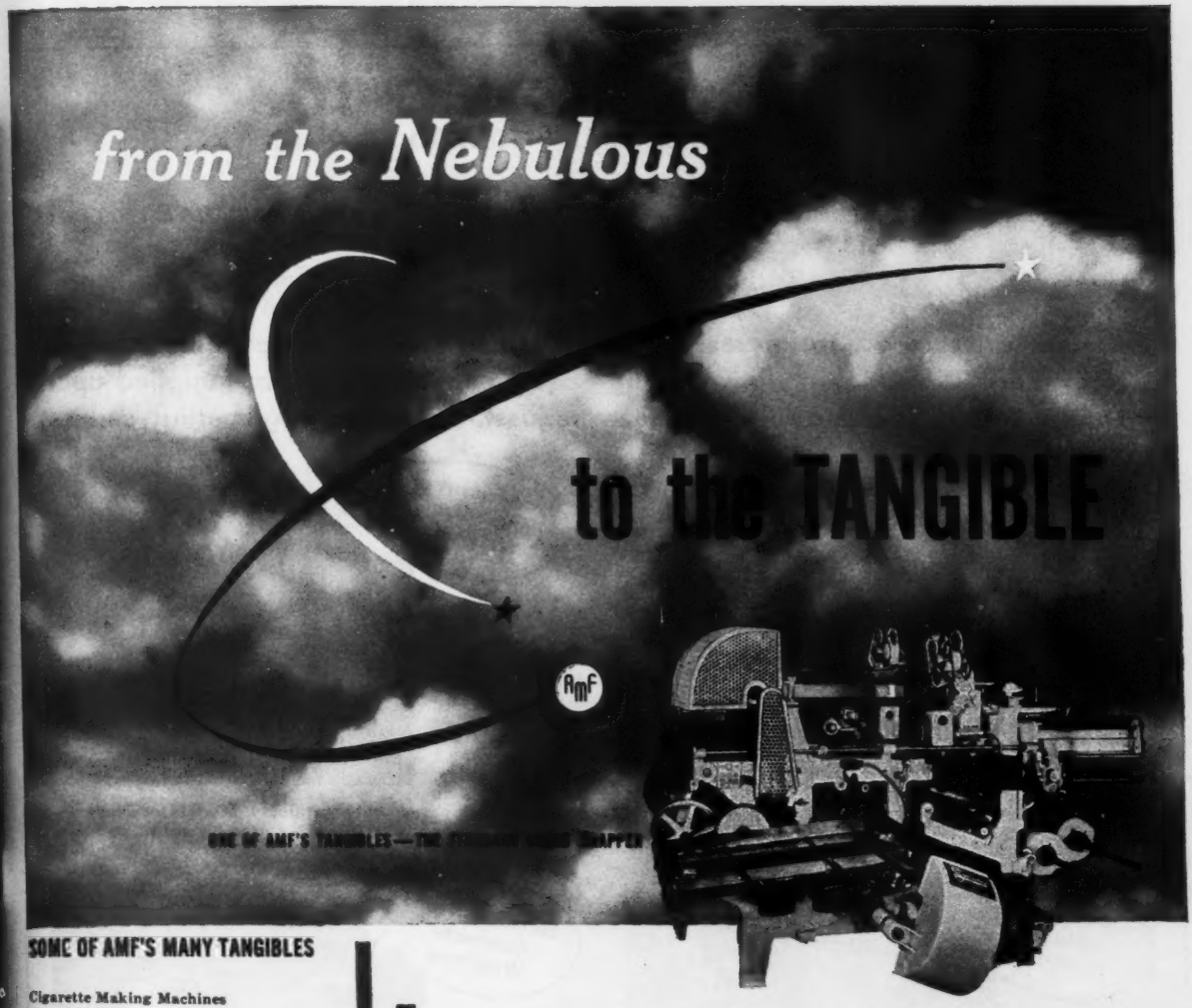
THE CORLEY-KELLER SANDWICH MA
AND CORLEY AUTOMATIC WRAPPE

Miller offers machines that bring new efficiency and economy to packaging operations . . . dependable, speedy equipment for: 1. Wrapping, 2. Sheeting and Gluing, 3. Bag Making, 4. Bag and Carton Weighing and Filling, 5. Rotary Bag Sealing or Crimping, 6. Sandwich Making and Wrapping. Also hand and foot operated heat sealing Crimpers, Hot Plates, and Hand Sealing Irons. Send for literature or ask for the assistance of our packaging engineers on specific problems.

** Makes sandwiches from crackers and peanut butter or similar spreads.*

Miller *Wrapping & Sealing Machine Co.*

18 SOUTH CLINTON ST., CHICAGO 6, ILLINOIS



ONE OF AMF'S TANGIBLES—THE [illegible] WRAPPER

SOME OF AMF'S MANY TANGIBLES

- Cigarette Making Machines
- Cigarette Packers
- Cigarette Tobacco Leaf Stemmers
- Tobacco Weighing & Packing Machines
- Necktie Slip Stitching Machines
- Ornamental Stitching Machines
- Wahlstrom Chucks
- Bread Wrapping Machines
- Bakery Ovens
- Vertical Mixers
- Bread Pan Greasers
- Pretzel Tying Machines

To create and build tangible machines from nebulous ideas is a task of vital importance to industrial progress. How well American Machine & Foundry Company does this job is evidenced by the number of AMF machines doing a specialized packaging job throughout America. The transition from nebulous to tangible involves a closely coordinated, highly skilled organization backed by a security founded on high standards. AMF represents master engineers working with trained research men. It represents precision construction with durable materials in AMF's own large factories. Important, too, are the thorough laboratory and field tests involved. Machines for every purpose are being designed and built for American industry by these specialists—foremost among these are in the tobacco and bakery equipment fields. Because AMF machine designers are also engineers, business men and economists, they are your guarantee that the machines AMF builds for you will do the job best.

AMF INVITES CONSULTATION ON PACKAGING MACHINERY AND EQUIPMENT PROBLEMS

AMF **AMERICAN MACHINE & FOUNDRY CO.** 511 FIFTH AVENUE NEW YORK 17, N.Y.

TOLEDO SCALE CO.

1029 TELEGRAPH ROAD - TOLEDO 12, OHIO

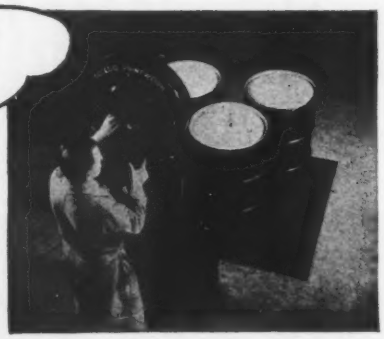
CANADIAN TOLEDO SCALE CO. LIMITED, TORONTO, ONT.

SALES AND SERVICE IN 181 CITIES, U.S.A. AND CANADA

TOLEDO SCALES

For greater Accuracy...for greater Speed ...for greater Dependability in weighing —Look to Toledo! There's a Toledo to meet your Exact Needs. Helpful literature on equipment shown will be supplied upon request. Complete engineering service.

Permanent Weight Records



• Printed weight figures eliminate human errors, guard accuracy of vital weight records. Toledo Printweigh Scales available in a range of sizes and capacities. Prints on tickets or paper tape; multiple copies. Easy to operate.

Accurate Ingredient Weighing



• Ingredients carefully proportioned by weight assure product uniformity and highest quality. Toledo Scales weigh ingredients accurately, quickly. Models for every type of weighing, from heavy-duty to extremely sensitive scales.

Speedy and Accurate Packaging



• Speedweigh scales in both center or end-tower models have full range of commodity equipment. Large ounce graduation, with easy-to-read chart for highest accuracy in packaging, checking operations. No need to level scale. In-built carrying handle.

Electric Cut-off Automatic Weighing



• Where entirely automatic operation is desired, Toledo Electric Cut-Off Scales, using either photo-electric or mercury magnetic cut-offs, are available. Scale automatically dumps correct weight of material being packaged. Rapid and highly accurate.

Bagging and Filling Operations



• Accurate filling of heavier bags and containers is rapidly accomplished with Toledo Over-and-Under Dial Scales. Wide indicator travel provides close accuracy in trimming filled packages. Available in either portable floor or bench style scale.

Receiving and General Weighing



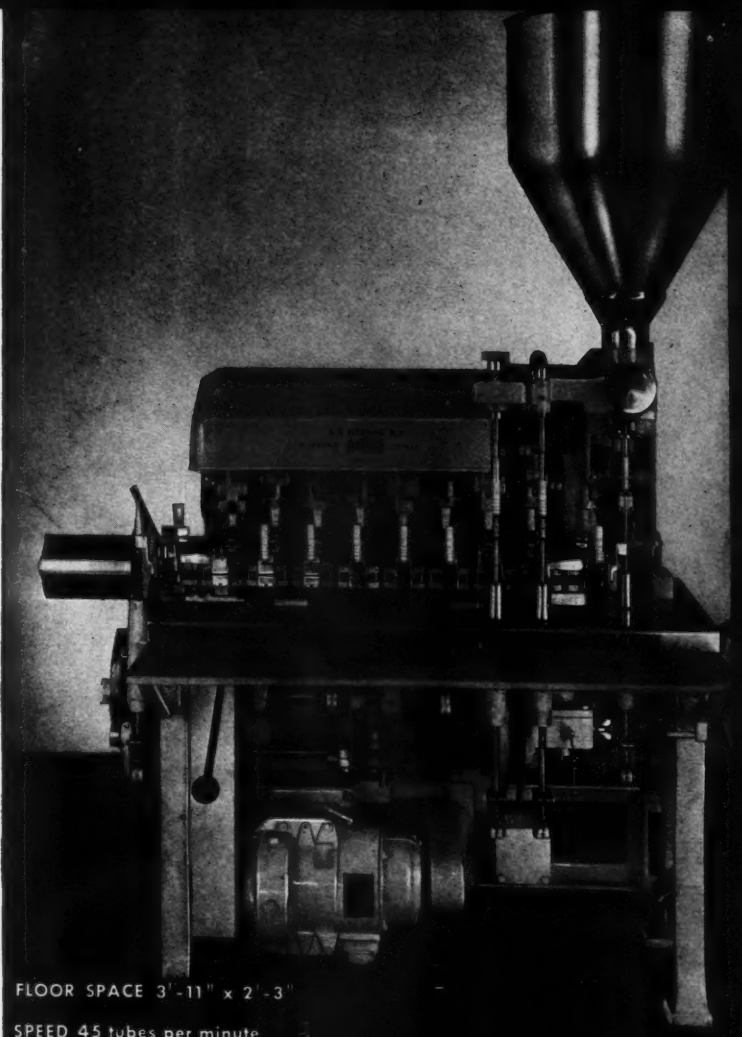
• Toledo "1500" floor scales are ruggedly built for receiving, shipping and general heavy weighing. Highly accurate. May be equipped with Toledo Printweigh for indisputable printed weight records in either tape or ticket form, or combination of both.

THE ARENCO TUBE FILLER

Fills, closes and seals collapsible tubes . . . interchangeable to handle pastes, creams, lotions and liquids . . .

FEATURES . . .

- Automatic cap tightening.
- Automatic tube cleaning before filling.
- Positively correct quantity in each tube.
- Clean filling—no spattering of inside closure wall—no material trapped in folds.
- No tube, no fill—no material delivered from filling nozzle if tube is missing.
- Ample passage for material—no valves or long tube connections. No squeezing to change consistency or viscosity of material.
- Quick cleaning when changing from one material to another.
- Quick changing from one tube size to another.
- All parts of machine easily accessible for control, lubrication, and cleaning.
- Stainless steel or other non-corrosive metals are used in all parts contacting the material.



FLOOR SPACE 3'-11" x 2'-3"

SPEED 45 tubes per minute

ONE OPERATOR

TYPES OF ARENCO CLOSURES





WHEN THE WAR ENDS

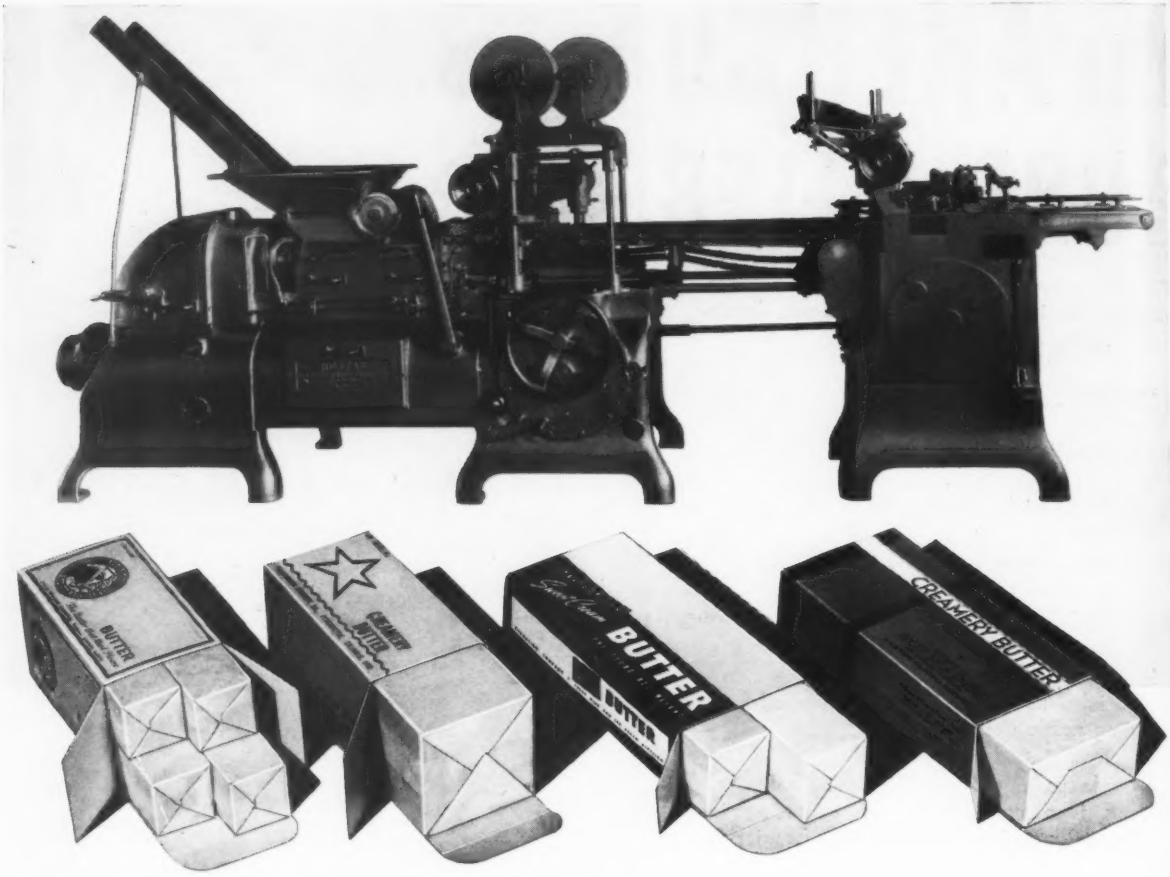
All Arenco facilities are devoted to War Work but we are prepared to meet post war needs quickly, and invite inquiries to meet your normal requirements for Post War Deliveries.

MACHINE COMPANY

INCORPORATED

ARENCO

NEW YORK 18, N. Y.



MORPAC.. *A Precision Production Machine for Print forming, Wrapping and Cartoning of Butter and Oleomargarine*

Here in one sturdy built unit is the answer to the print room problem for faster production, better package appearance and lower packaging cost. From churn to carton—Morpac handles butter and oleomargarine in one continuous operation so efficiently that the Morpac model T and one operator can package up to 3600 pounds per hour.

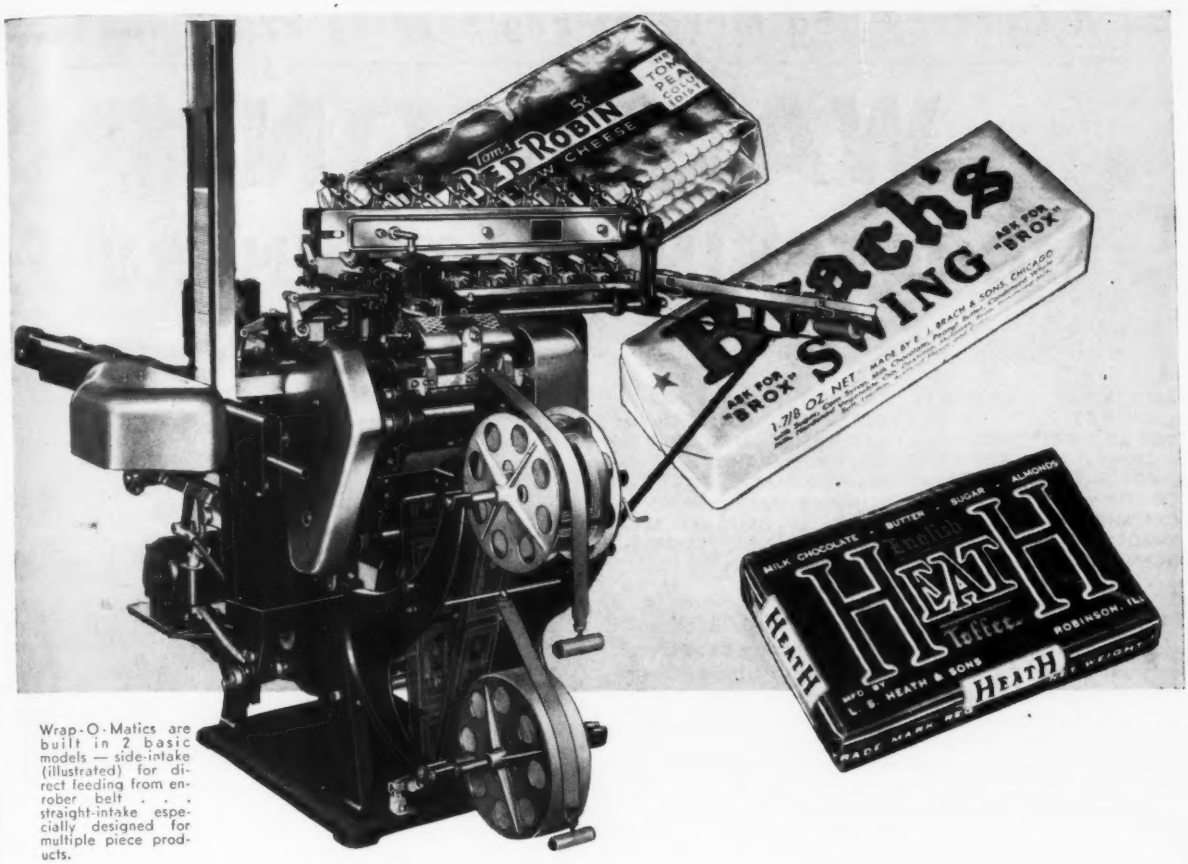
Morpac automatically molds individual prints, in one pound or quarter pound sizes; Elgin or Western Style, wraps with parchment, and places into cartons, at temperatures from 45 to 50 degrees and at speeds of 3600 one pound prints or 8000 quarter pound prints per hour. All prints are uniform in weight to within 1/16 ounce per pound.

Simplicity of design and construction make cleaning and sterilization easy and all parts that come in contact with product are made of stainless alloy metals to meet extreme sanitation requirements of State and City boards of health.

Plan now to streamline your print room production . . . arrange for our Morpac engineers to solve your packaging problem. Write today for more complete details.

MORPAC Lynch DIVISION

Manufacturing Corporation, Toledo 7, Ohio U. S. A.



Wrap-O-Matics are built in 2 basic models — side-intake (illustrated) for direct feeding from enrober belt . . . straight-intake especially designed for multiple piece products.

WRAP-O-MATIC ... *A High Speed Machine for Wrapping Fragile and Irregular Shaped Candy Bars, Biscuits and Cookies*

High speed wrapping, added sales appeal, tremendous savings in wrapping labor and material, and the successful wrapping of soft, fragile and irregular shaped bars and biscuits are the reasons for Wrap-O-Matic's unusual popularity with leading confectionery manufacturers and bakers.

Wrap-O-Matic operates at high speed (up to 120 units per minute) saving up to 80% in wrapping labor and up to 35% in wrapping material. Shape and texture are no obstacle, neither is the type of wrapper used, for Wrap-O-Matic uses glassine, cellophane, foil or any type wrapper that can be printed in rolls.

Over 170 leading bars, biscuits, and cookies, representing over 80 large manufacturers, now have the extra sales appeal of Wrap-O-Matic packaging. You, too, can enjoy the benefits of Wrap-O-Matic. Let us survey your wrapping department and show you how Wrap-O-Matic can increase your production, sales and profits.

Write today for our illustrated brochure and more complete details.

WRAP-O-MATIC Lynch DIVISION

Manufacturing Corporation, Defiance, Ohio U. S. A.

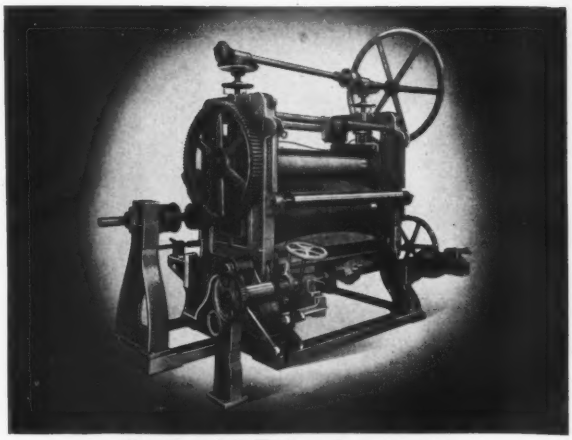
XUM

A Century and More of Engineering Experience

WALDRON
PROCESSING MACHINERY

ANILINE PRINTING MACHINES
ROTARY PRINTING MACHINES FOR ALL PURPOSES
COATING MACHINES
CREPEING MACHINES
EMBOSSING MACHINES
GUMMING MACHINES
LAMINATING MACHINES
PAPER ROLLS (EMBOSSING)
SATURATING MACHINES
SLITTING MACHINES
WAXING MACHINES
WINDING MACHINES
SPECIALLY DESIGNED MACHINES FOR PROCESSING PAPER

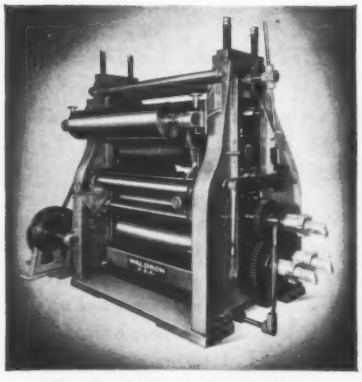
In its design and construction, every WALDRON machine reflects a background of engineering experience extending over a period of a century and more. Their design refinements, accurate proportioning and sturdy rigid construction combine to insure the greater output of finer quality products that has maintained the WALDRON position of leadership in the field of processing machinery. For every step in your processing, from raw stock to finished product, WALDRON can supply the right machine.



Centennial Embossing Machine

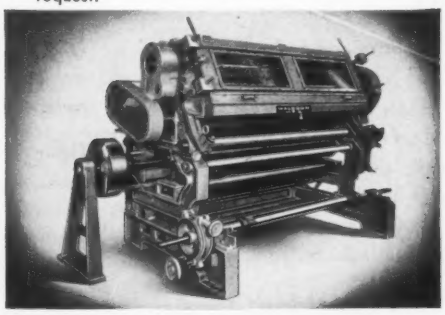
Sub frame permits quick change of design. Equipped with advanced pressure regulating and recording device for applying equal pressure on both sides of machine. Anti-friction bearings throughout. Automatic stop.

Whatever your requirements, if it is in connection with Paper Converting, use the facilities and service of our Engineering Department. Descriptive literature is available on request.



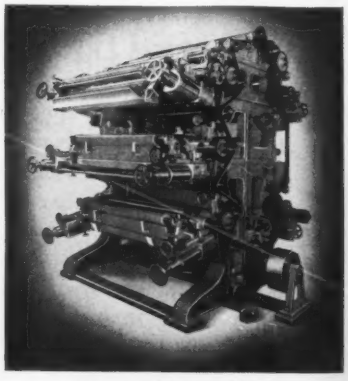
Vertical Type Laminator

New vertical design requires minimum of floor space. Applies any kind of adhesive smoothly without troublesome "ribbing." Combines paper, paper and board, cloth, regenerated cellulose.



Horizontal Reverse Coating Machine

Especially designed for applying quick drying lacquers or varnishes. Applies smooth, uniform coat. Ideal for metallic, lustre or waterproof coating on paper or fabric.



Decorative Printer

All purpose, for rotogravure, surface, direct or aniline printing. Interchangable printing heads. Widths changed without lapping. Permits adjusting register without stopping machine.

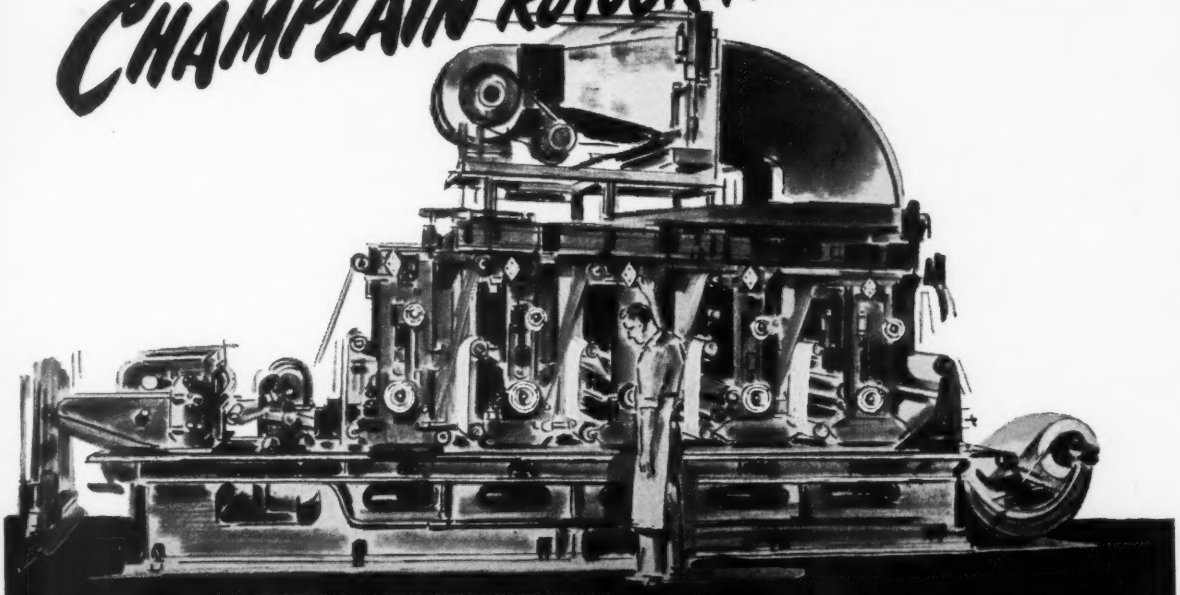
JOHN WALDRON CORP.

Main Office & Works – NEW BRUNSWICK, NEW JERSEY

BUILDERS OF QUALITY MACHINES SINCE 1827

1 ONE CONTINUOUS OPERATION 2 3 4 5 ..COLORS

CHAMPLAIN ROTOGRAVURE PRESS



NSTANT drying gravure inks make it possible for you to print any number of colors, one on top of another, and fabricate or rewind the printed stock, without offset in one continuous operation. The simplicity of the gravure principle puts an end to many of the difficulties of register control encountered when drying time must elapse between printing of colors or between printing and fabricating.

With the Speedry enclosed ink fountain (a patented Champlain feature) the ink remains uniform, no splashing onto the web is possible and the fountain protects the ink from foreign particles. Highly volatile solvents may be used without fear of evaporation. A wide variety of stocks, including cellophane and glassine, can be printed successfully in multi-colors in one continuous operation.

Write today for booklet entitled "Advantages of Rotogravure for Package Printing."

COMPANY, INC.

SUBSIDIARY OF THE FRED GOAT CO., INC.

636 ELEVENTH AVENUE . . NEW YORK 19, N. Y.

CIRCULATION* VERSUS DISTRIBUTION

*Modern Packaging Magazine, as the only ABC publication in the packaging field, republishes this advertisement as a guidance for all advertisers.

● Circulation is readership.

Distribution is an uninvited guest.

Circulation is bought and paid for—by the reader.

Distribution is bought and paid for—by the publisher.

Distribution is artificial circulation—a selection of names which satisfies the publisher's mental vision of what a circulation list should look like.

In circulation, the reader selects the publication. In distribution, the publisher selects a list of names he hopes will be readers.

MODERN PACKAGINGS' circulation has been built up over 17 years of service to the packaging field. Numerically it means that 8376 hard-headed businessmen have decided they need MODERN PACKAGING enough to pay $5.00 a year for it.

MODERN PACKAGING is known by its readers as the authoritative fountain-head of facts and information about packaging. Its extra-curricular activities for the promotion of packaging public relations via the famous All-America Packaging competitions, motion pictures, exhibits, special publications and others (including the editing and publishing by Modern Packaging's staff, of the annual packaging Encyclopedia, the PACKAGING CATALOGS)—all these have served to anchor and solidify its position.

Actually there is no comparison because—distribution is lifeless—a postage stamp, a mailing sack, a waste-basket.

CIRCULATION IS ALIVE — IT BREATHES, BUILDS AND BUYS.

MODERN PACKAGING MAGAZINE

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...the only ABC packaging paper
...the authority on the subject
...the established institution in its field
...one of America's great industrial publications!

Published by BRESKIN PUBLISHING COMPANY
122 EAST 42nd STREET, NEW YORK 17, N. Y.
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A Message to Bottlers and Packagers of Liquid and Semi-Liquid Products

During the exigency of war many have had to get along with old equipment, or resort to hand and semi-automatic operation.

Our long experience in the manufacture of Bottling Machinery and Engineering and Installing Bottling Plants for producers in the Drug, Chemical, Food, Beverage, Distilling and other fields, is available to promote your reconversion.

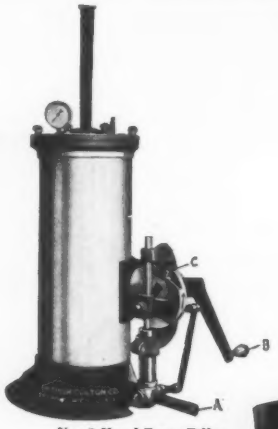
Some U. S. Hand and Semi-automatic equipment is available to cushion this period of reconversion and we will be equipped to furnish Fully Automatic Bottling Machinery as fast as availability of needs in this industry permits.

In the photomontage on this page is shown pictures of various U. S. Machines rendering service to our customers throughout the world.

U. S. BOTTLERS MACHINERY COMPANY

Bottling and Packaging Engineers

4015-4031 NORTH ROCKWELL STREET • CHICAGO, ILLINOIS



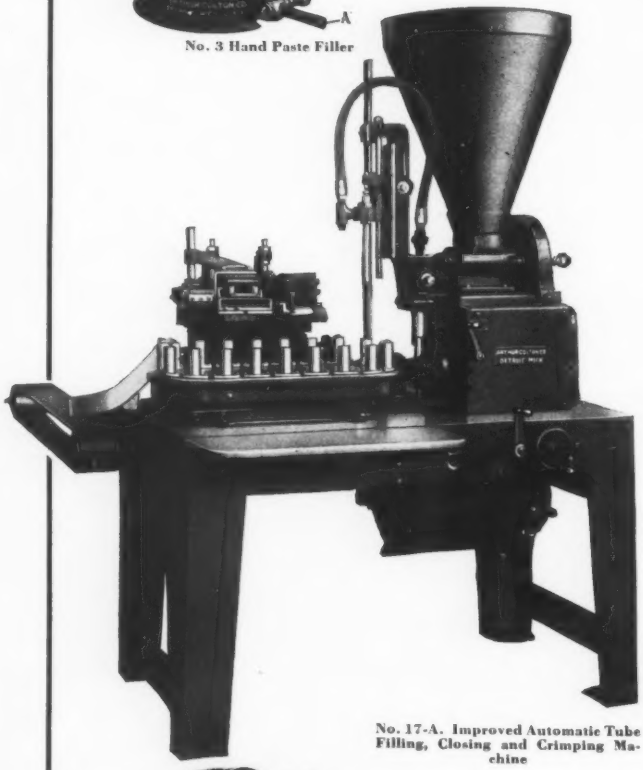
No. 3 Hand Paste Filler



Hand Tube Closer



Foot Power Crimper



No. 17-A. Improved Automatic Tube Filling, Closing and Crimping Machine



Electric Drive Stirring Device as shown is recommended for materials that do not flow readily in our standard hopper

COLTON

HAND OPERATED MACHINES

No. 3 Collapsible tube filler (hand operated) for tubes up to 1″ x 5½″ long.

Hand operated tube closer made in two sizes and styles to seal tubes with the Colton Clipless Closure or to seal tubes for applying clips.

Foot operated crimper for applying final corrugation to the closed end of the Colton Clipless Closure which gives it a decorative appearance as well as greater rigidity to the closed end of tube.

We also furnish this same machine without the crimping jaws for applying clips.

Our catalog No. 11 illustrates a variety of fillers and closers to suit production required. Please make us acquainted with your requirements and capacity, and we will be pleased to recommend machines best suited for your purpose.

YOUR IMMEDIATE ATTENTION IS CALLED TO THIS NEW No. 17 IMPROVED AUTOMATIC TUBE FILLING, CLOSING & CRIMPING MACHINE for SEALING COLLAPSIBLE TUBES. TYPE "A" for PASTE. "B" for POWDERS. "C" for LIQUIDS.

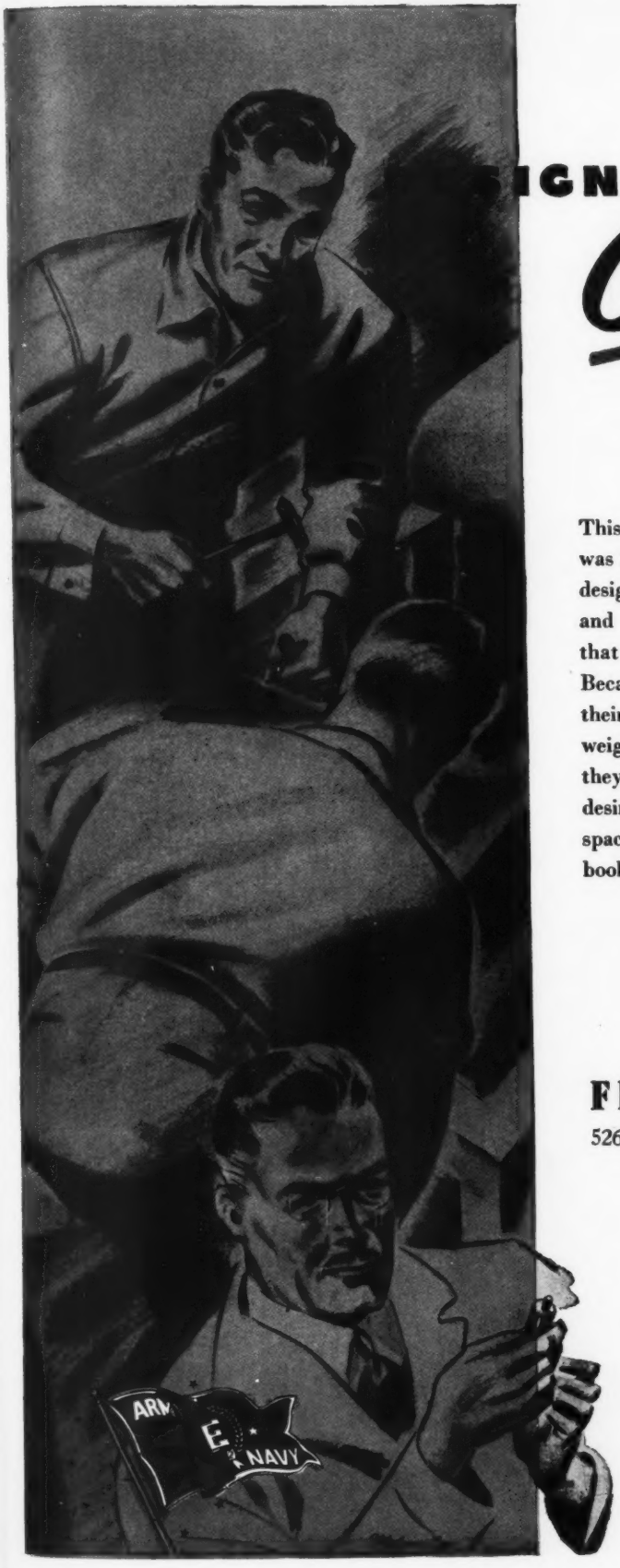
The famous COLTON CLOSURE machine has been greatly improved and simplified. It now offers you these new advantages:

1. **Motor is underneath, out of the way.**
2. **Equipped with REEVES drive for speed control.**
3. **New design filling head gives a positive free smooth action of nozzle.**
4. **Start and stop push button switch.**
5. **Two hand levers. One for starting the machine proper. One for stopping and starting filling mechanism.**

Write today for a sample tube and full information on this machine.

ARTHUR COLTON CO.

2602 JEFFERSON AVE., EAST
DETROIT, MICHIGAN



IGNED TO DO

One job Better

This company was founded seven years ago when it was foreseen that a demand would arise for machinery designed to solve specific problems. Palmer-designed and Palmer-constructed machines meet special needs that cannot be handled as well by standard machinery. Because many Palmer machines are custom-built for their purposes—whether it be packaging, processing, weighing, counting or filling, or all simultaneously—they perform with greater efficiency, greater speed (if desired), and with greater economy in operational and space-rent costs. Send today for your copy of a new booklet, "Packaging Predictions."

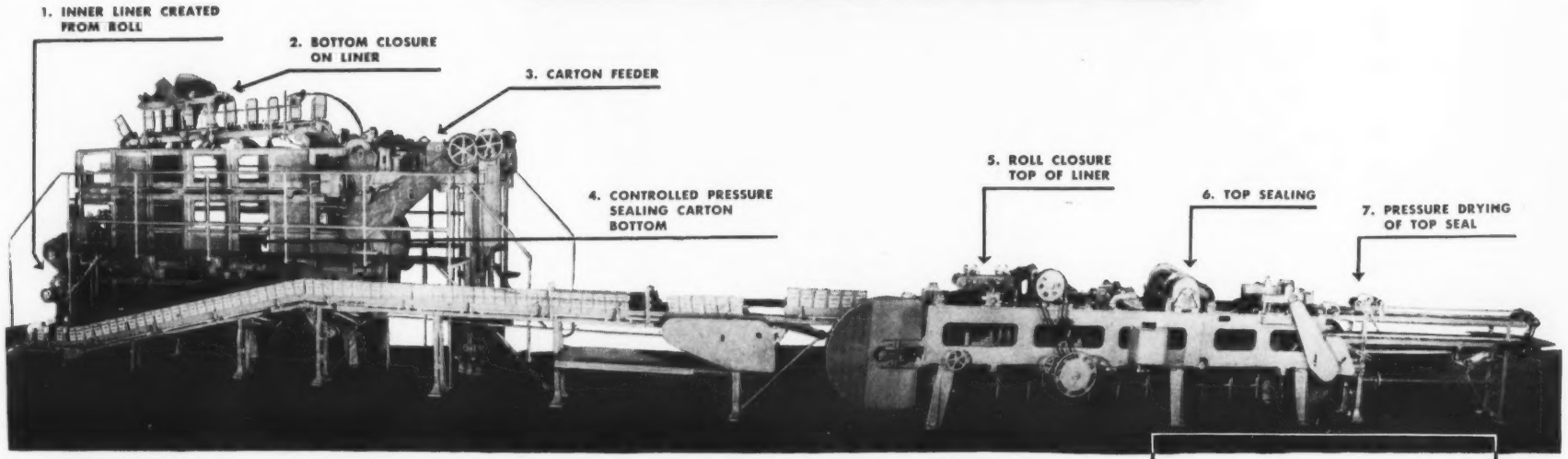
PALMER

FRANK D. PALMER, INC.

526 North Western Ave., Chicago 12, Illinois

Packaging Development Laboratory
Special Machinery Manufacturers

2 Machines . . . for 7 Packaging Operations . . . in 1 Continuous Flow . . .



Battle Creek Packaging Machines can be combined to offer you complete packaging service from the blank carton to the finished package. Whether your requirements call for 30 cartons per minute . . . 60 per minute . . . 90 per minute . . . or 120 per minute . . . integrated sealing, filling, and wrapping machines are available to serve you with continuous flow production.

Illustrated above is an outstanding example of Battle Creek continuous flow packaging equipment. All operations of feeding the carton blank, creating an inner liner, sealing the bottom of the carton under Controlled Pressure Sealing, roll closing the open mouth of the liner, sealing the top of the carton, and pressure drying the top seal, are accomplished under continuous motion at speeds up to 90 cartons per minute. Filling machines may also be provided to complete the packaging operations, and wrapping machines furnished where needed.

Your packaging production flows along in one uninterrupted and continuous operation, with Battle Creek integrated packaging machines, at whatever speed you select and for whatever packaging operation you require. Eliminated are jerky stops and starts, inefficient cam motions, rapid-wearing vibrations. Your packaging schedules are more easily maintained because of longer wearing machinery.

Write for more complete information on Continuous Flow Battle Creek Packaging Machines.

Continuous Flow GIVES THE GREEN LIGHT TO PACKAGING PRODUCTION

FOR A COMPLETE PACKAGING SERVICE

BATTLE CREEK
BREAD WRAPPING MACHINE CO.
JOHNSON SEALER DIVISION
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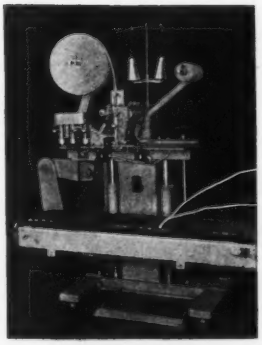
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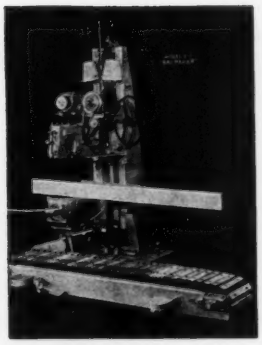
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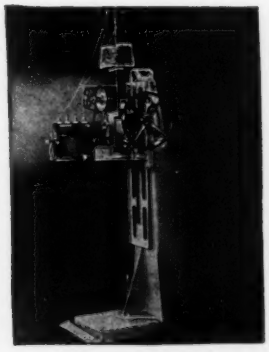
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ALL of these Bagpakers make the nationally known Cushion Stitch closure. The models "A" and "D-A" automatically apply either plain or moisture proof kraft tape over the stitching — thus effectually sealing the closure against sifting, or moisture-vapor penetration, or loss. Models "E-1" and "F-1" apply only the cushion stitch and are for use where the sealing tape is not required. Each is equipped with a specially designed sewing head which lays a thick soft cord across the bag end and cross-stitches around without going through it. This cord forms a cushion or shock absorber that takes up the strain of handling or dropping the bag, and prevents the stitching from pulling through the bag walls. The closure is in fact the strongest part of the bag.

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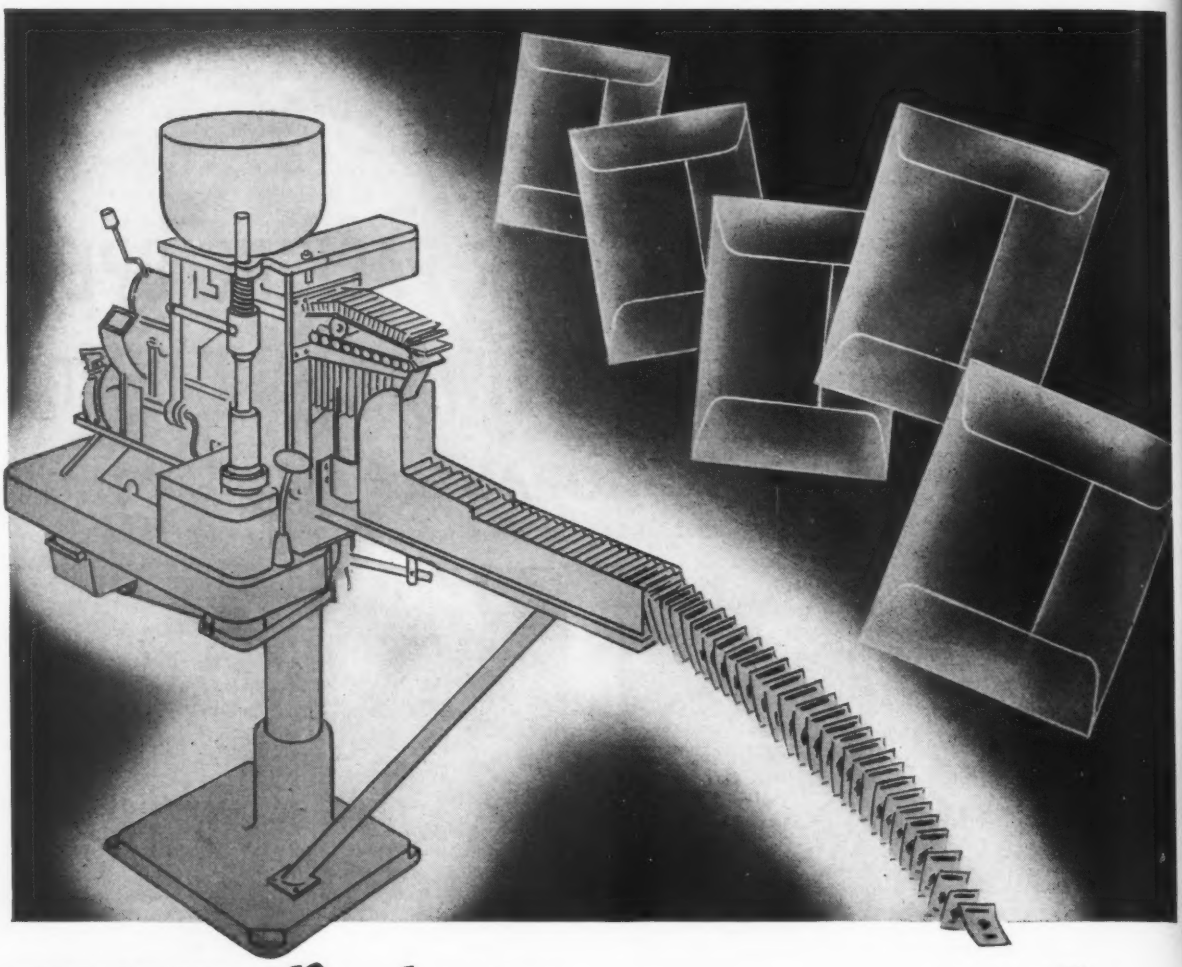


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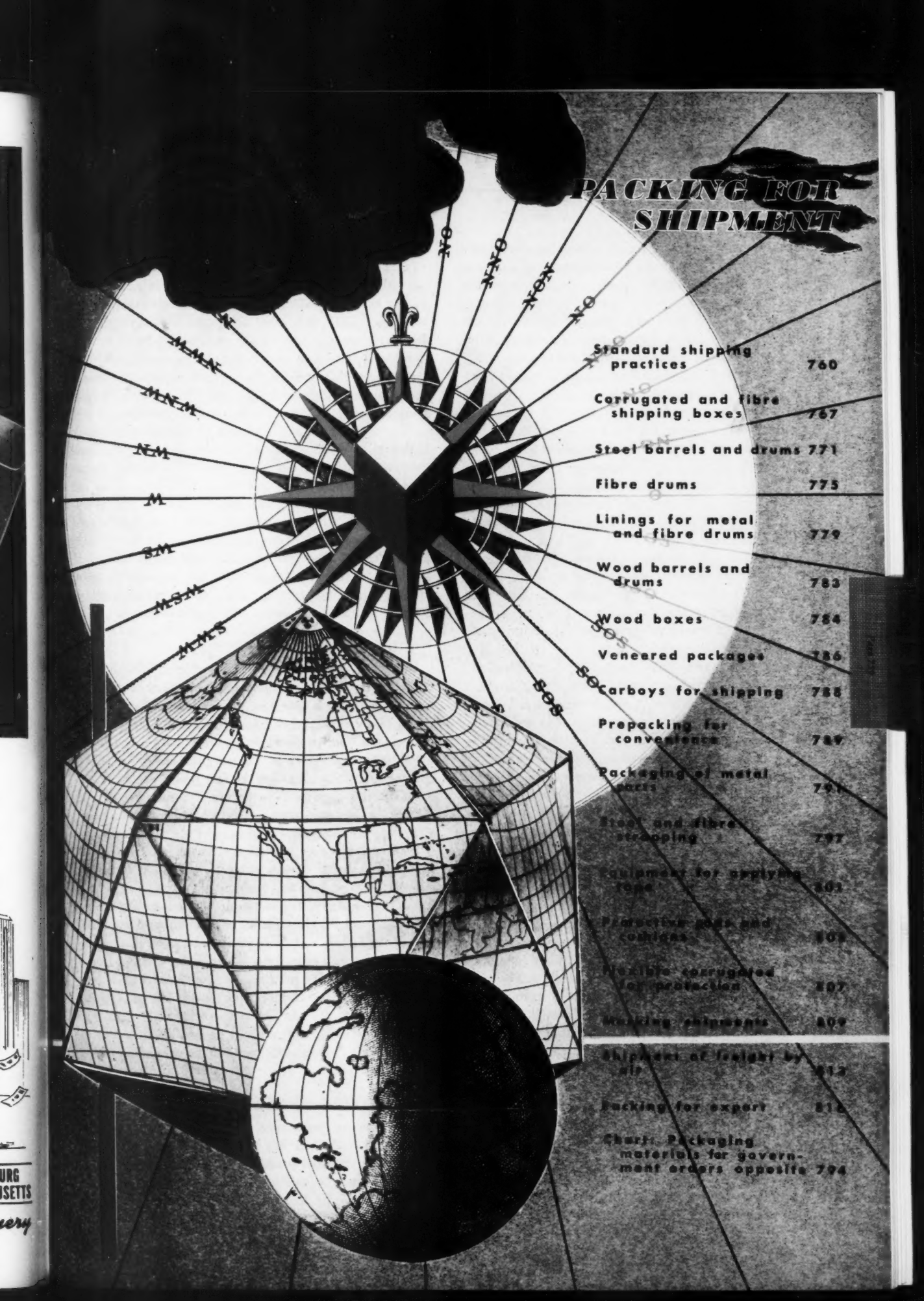
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Manufacturers of Open End Envelopes, Packets and Packaging Machinery



PACKING FOR SHIPMENT

Standard shipping practices 760

Corrugated and fibre shipping boxes 767

Steel barrels and drums 771

Fibre drums 775

Linings for metal and fibre drums 779

Wood barrels and drums 783

Wood boxes 784

Veneered packages 786

Carboys for shipping 788

Prepacking for convenience 789

Packaging of metal parts 791

Steel and fibre strapping 797

Equipment for applying tape 803

Protective pads and cushions 805

Flexible corrugated for protection 807

Marking shipments 809

Shipment of freight by air 813

Packing for export 816

Chart: Packaging materials for government orders opposite 794

Standard shipping practices

Despite the acceleration of freight movement necessitated by the war, and the inevitable adjustment of shipping practice to meet conditions, traffic regulations remain basically the same. Some adjustments represent advances which may well be permanent gains, while others are temporary expedients to meet current conditions only. (See *New Shipping Practices and Conditions*, p. 37.)

One gain which will doubtless remain is the development of a more successful weatherproof box, on which progress has been evident since it was first announced. Aside from the service which this box is performing for the war effort, this outstanding development is of great interest to the fibre shipping-container industry which looks forward to the use of boxes of this kind for service in postwar days in the packing, handling and distribution of many perishable foods. This will include fresh fruits and vegetables which were not, to any extent, shipped in fibre boxes in the past because no fibre container was readily available that would stand up under cold storage, refrigeration, high relative humidity and the other marketing conditions met with in this trade.

One interesting new development in the shipping of metal parts and equipment is referred to as "Method II" and is covered by Army-Navy Aeronautical Specification AN-P-13. The method was worked out cooperatively as a result of the efforts of Army and Navy engineers in conjunction with commercial concerns who supply and fabricate the materials. Briefly, it involves the use of an envelope or sack made of transparent moistureproof film inside of which are placed several containers of the highly hygroscopic substance, silica gel. This method permits machine parts to be put into immediate use on arrival at the point where they are needed, saving the time formerly used in removing grease. (See *Packaging for Government Orders*, p. 96, and *Packaging of Metal Parts*, p. 791.)

An example of temporary change is one caused by the critical shortage of paperboard. This resulted, as early as 1941, in pressure being brought to bear on the Association of American Railroads to relax the specification requirements for fibre boxes as published by the carriers.

This pressure resulted in the action which was taken by the Consolidated Classification Committee in relaxing the specifications for fibre boxes as published in what is known as Rule 41 of the Consolidated Freight Classification. Effective November 15, 1941, the caliper and bursting strength of fibreboard were reduced below the former minimum standards. Although this was intended as a temporary emergency measure, conditions have made it necessary for the Classification Committee to extend the life of the relaxed regulations to May, 1945, with the probability of further extension for the duration. These actions were taken notwithstanding the knowledge on the part of the transportation companies that packages of all kinds were being subjected to greater strain, because of heavier loading of merchandise cars as required by orders of the Office of Defense Transportation, and also notwithstanding the fact that the freight claim account of the railways was showing a steady increase since the middle of 1941. While the relaxation of the regulations for fibre boxes is not wholly responsible for increased damage claims—one contributing factor, probably, being the loss by railroads of experienced men to the armed services—nevertheless it is felt the relaxed regulations have contributed to unsatisfactory conditions.

In connection with this subject of relaxed regulations, it should be mentioned that following the Freight Classification publication November 15, 1941, similar reductions were made in the specifications contained in the publications of the Federal Specification Board, Washington, D. C., which are known as Emergency Alternate Specifications which were made effective in May, 1942. These Federal Specifications are basic requirements of several governmental departments and are used to some extent as governing specifications for boxes for the shipment of articles purchased by the government.

Efficient packing and packaging necessary

Obviously, there is danger in introducing into the general shipping field any container which is not of sufficient strength to make a safe and serviceable package or one which may not deliver its contents in good condition at final destination, particularly in these times when waste must be prevented at all reasonable cost and effort. Shippers must also consider the fact that conservation of transportation facilities necessitates the heavier loading of merchandise cars, with a resultant greater strain upon shipping containers and packages of every description.

Wartime shipping and transportation conditions not only require better outside shipping cases, but also adequate interior packing and cushioning to protect the goods within the container. The matter of sufficient good packing is of paramount importance in connection with the shipping of fragile articles. Each presents an individual problem. If a shipper's experience shows undue damage in the transportation of his product, he should investigate. He will find that in most instances the trouble can be rectified through the use of more, or perhaps stronger, packing, and that any added expense will be justified in order to provide a safe shipping package for the protection of his goods in wartime.

Standard practices

The preceding paragraphs review changes in shipping practice which the war has brought. For the most part, however, the standard practices remain in force, and the following serves to summarize them, at the same time directing the reader to sources where more detailed information may be obtained. Many of the subjects are also

XUM

treated at greater length in this edition of the PACKAGING CATALOG.

Shipping agencies in the United States include rail (freight, express, baggage and parcel post), trucks, ships and airplanes. While airplane shipments of freight are new and very small proportionately, the end of the war will undoubtedly leave thousands of planes looking for new uses and scores of plane factories looking for new outlets. One logical peacetime outlet is air freight and we are destined to see great progress here.

Today, however, the great bulk of merchandise travels by rail freight and the following considerations are, therefore, directed chiefly to this method, remembering that trucks and, to a lesser extent, other methods of transportation follow similar general principles. Our interest here, therefore, is in freight and particularly in the methods of packaging merchandise for LCL freight since many C/L shipments are bulk while most LCL shipments are packaged.

Official container regulations

To play any game properly, it is first necessary to know the rules. These rules on shipping methods are quite complicated in the aggregate, but become simpler when properly broken down. Although we can touch only the high points here, it is well to consider the most important ones, which are:

Consolidated Freight Classification Rules 5, 40, 41
Motor Truck Classification (interstate and common carriers)
Official Express Clasification Rule 18
Bureau of Explosives—dangerous articles by freight, express, baggage, motor vehicle (highway), steamship and water (ships)
Parcel Post
Freight Container Bureau (perishables such as fruits and vegetables)
U. S. Government Federal Standards (there are several hundreds of these)
U. S. Treasury Department Regulation No. 6 covering bottled-in-bond spirits
There are no uniform specifications for trans-ocean shipments
There are no official airline specifications

Freight regulations

The freight regulations are fairly complicated at first glance. Thus, it is first necessary to look up your product under the commodity rate tariff of your individual railroad association (for instance, the New England Freight Association). This is assuming that the shipment would move at commodity rates. However, if it moves under exceptions to the classifications, it is necessary to refer to the "Exceptions to Classification" published by the associations. If it moves under the classification ratings, it is then necessary to refer to the Consolidated Freight Classification. In other words, commodity rates take precedence over the exceptions and the exceptions, in turn, take precedence over the classification. The above is necessarily a very brief and general description of one of the most complicated traffic subjects.

Actually the Consolidated Freight Classification is the reference in most use as this large volume lists each commodity giving in most instances the form of container to be used. These containers in turn are described in detail in Rules 40 and 41 at the end of the book and also under the special container descriptions printed on the blue colored pages near the end of the book.

The Consolidated Classification book may be consulted at 143 Liberty Street, New York, or it may be secured by

FIBREBOARD BOXES IN COMMON USE

Maximum weight of box and contents (lb.)	*Maximum inside dimensions—length, width and depth added (in.)*	SOLID FIBREBOARD		DOUBLE-FACED CORRUGATED FIBREBOARD, SEE NOTES 2 AND 3*		
		Minimum thickness of board (in.)	*Minimum test per sq. in. (lb.)*	*Facings: minimum thickness (in.)*	*Facings: minimum test per sq. in. (lb.)*	*Minimum test per sq. in. of combined board (lb.)*
ALL FIBRE BOXES NOT OTHERWISE PROVIDED FOR BELOW, SEE SECTION 4*						
20	40	.045	125	.009	...	125
40	60	.060	175	.016	85	175
65	65	.080	200	.016	100	200
90	70	.100	275	.030	135	275
TWO COMPLETE DOUBLE-FACED CORRUGATED BOXES, ONE FITTING CLOSELY INSIDE THE OTHER, SEE SECTION 4*						
90	70	...	...	.016	85	175 (Each Box)
DOUBLE-WALL CORRUGATED BOXES, SEE SECTION 4*						
65	65	...	...	2 Outer .016 1 Center Liner .016	†85	200
90	70					275
120	100	...	...	2 Outer .030 1 Center Liner .016	200 100	500
140	115	...	...	3 Liners .030	200	600

* References are to Consolidated Freight Classification.
† No test required for center liner for 65-lb. box.

XUM

subscription from the Consolidated Classification Committee, Union Station, Chicago. The subscription rate is $2.50 per annum and includes all supplements.

Packing perishables

In July 1935, the Freight Container Bureau of the Association of American Railroads, 30 Vesey Street, New York City, was given full jurisdiction over all containers used for packing fresh fruits and vegetables, and the methods of loading these containers in freight cars. The Bureau prepares its own container specifications and loading rules tariffs, which are published for the Bureau by J. J. Quinn, Agent, Union Station, Chicago, Ill. The country is divided into four sections, each covered by a tariff; and copies of these tariffs can be obtained from Mr. Quinn. The Bureau also issues its own dockets and holds public hearings three times a year.

Through the medium of a test rule, permits for which are under the jurisdiction of the Bureau, a ready means is provided shippers and container manufacturers to try out promising new containers, or developments in old containers, in actual shipments.

Test shipments

The carriers recognize that constant experimentation is the road to improved containers and reduced damage claims. For that reason, they are very lenient and cooperative in regard to legitimate test shipments of new containers. Sometimes these can be arranged for by conferring with the carrier involved while the Freight Container Bureau and the Freight Classification Committee have definite procedures for carrying out such test shipments. In respect to freight, this procedure is described in detail in Rule 49 which has recently been added to the Consolidated Classification.

Express shipments

Shipments in fibre boxes by express must comply with the regulations of the Official Express Classification and particularly with Rule 18 of that classification. This pamphlet may be secured by application to the Railway Express Agency, Inc., 230 Park Ave., New York. The subscription is free on application and supplements are issued from time to time although only two supplements are in effect at any one time. Changes are less frequent than in the Freight Classification and are often arranged informally without regular docket hearings. Rule 18 follows the freight Rule 41 very closely but in a more abbreviated form. The principal differences are that on packages weighing 35 lb. or less a non-conforming box will be accepted unless such package exceeds 50 united in., in which case they must also be crated or "securely wrapped" for acceptance. There are certain exceptions to this rule and these are listed in the Freight Classification.

The other important difference is the fact that all regular express boxes will be accepted up to 90 united in. and the gross weights vary with the strength of the board. Some merchandise will not be accepted by express in fibre containers. This includes mirrors (value at over $2.00), statuary and other miscellaneous items.

Bureau of explosives

The shipment of all dangerous articles comes under the control of the Bureau of Explosives, 30 Vesey Street, New York, and their published regulations take precedence over the standard freight, express and other requirements. These regulations apply on all methods of transportation and a copy may be secured on application. The transportation of explosives and dangerous articles is covered by an Act of Congress, which Act authorizes the Interstate Commerce Commission to utilize the services of the Bureau of Explosives in carrying out and enforcing the provisions of the Act.

These Bureau of Explosives regulations cover inflammable materials, explosives, fireworks, poisons and other dangerous articles. In many cases special requirements must be complied with when packing this type of merchandise, such as the use of labels and special marking. Because of the dangerous nature of this merchandise, the Bureau has to impose stricter requirements than in the case of ordinary freight and has to be very efficient in policing and enforcing these rules. As a result the transportation systems of this country have an enviable reputation for the safe handling of explosives and other dangerous articles running back over a period of years.

Canadian requirements

While Canadian regulations are not as voluminous nor as detailed as those in the United States, they follow, in general, the American specifications very closely. This is especially true for freight.

Parcel post

The Post Office Department does not issue detailed packing specifications, although they do maintain a "Classification Department" at the New York City General Post Office. Rules may be studied by consulting the Postal Regulations or specific pamphlets available at all post offices. In case of doubt, submit your proposed package to your local postmaster. Parcel post packages must not exceed 70 lb. in weight nor 100 in. in length and girth combined which is equivalent to the "height plus the waist measure."

U. S. Government specifications

Until recently each branch of the Federal Government maintained an independent set of container specifications. This confusion was largely eliminated a few years ago by the establishment of the Federal Specifications. However, the Army, Navy, Marine Corps and others still keep many of their own specifications in force. For instance, the Army publishes an Index of specifications covering 250 pages and listing about 6000 individual items. All of these listings carry a coded number such as WW-P-377 which, in turn, refers to a separate pamphlet procurable from the Superintendent of Documents at a cost usually of 5 cents and this pamphlet, under paragraps G and H, describes the form of shipping container to be used for that particular commodity. Thus, the recipient of a contract for sphaghetti, for instance, finds in the Index that this is specification No. N-M-51. He then has to secure

XUM

this pamphlet which describes in detail just how the spaghetti must be made and paragraps G and H tell him how it must be packaged and shipped. In some cases these container requirements are specific while in other instances they simply state "commercial containers may be used." In other instances, the reference may be to the general Federal container specifications, some of which are as follows:

Specification LLL-B-631a—corrugated containers.
Specification LLL-B-636a—solid fibre containers.
Specification NN-B-601—cleated plywood boxes.
Specification NN-B-621—nailed and lock corner wood-end boxes.
Specification NN-B-631—wire-bound wooden boxes.

The Treasury Department also has some specifications of its own. One of these is known as "Regulation No. 6" and covers all containers for the shipment of bottled-in-bond spirits, takes precedence over other regulations.

Motor trucks

This form of transportation has now become so popular that there are several classification books available, the principal one being the National Motor Freight Classification published at 1013 Sixteenth Street, Washington, D. C. This also lists the various commodities and states how they should be packed, for instance "bags, boxes, barrels," etc., but does not require that these containers conform to any detailed specification. A movement is now under way to bring these containers into line with the present freight specifications.

Fibre containers

Inasmuch as fibre containers are still relatively new in comparison with wooden boxes, it is necessary to comply with certain legal regulations when using these containers for shipment. The principal regulations are:

Rail freight—The regulations for freight shipment of merchandise in fibre containers are promulgated by the Consolidated Freight Classification representing about 950 participating railroads and coastwise steamship lines. The services of an expert traffic man are required to decide whether a given product comes under the commodity rate tariff of an individual railroad association, under exceptions to the Classification or under the Classification ratings themselves. In the latter event, the requirements are uniform for all carriers and the detailed specifications covering the use of fibre containers are contained in Rules 5 and 41 of the Consolidated Freight Classification. This is a book of approximately 430 pages, about the size of a telephone directory, and may be secured from the Classification Committee, 202 Union Station, Chicago, Ill. There is a nominal subscription charge which includes all supplements. Every shipping man should subscribe to this service as the book not only contains all rules and regulations covering freight shipments and packing specifications for articles in fibre containers, but also lists the individual commodities together with prescribed methods of packing each.

Rule 5 states that "all containers must be such as to afford reasonable and proper protection to contents" and also defines such words as "packages," "bale," "bundles," "boxes," etc. Rule 41 defines "boxes" of various accepted styles and describes how they should be manufactured, sealed, tested and otherwise made ready for shipment. Inasmuch as each of these words has a very definite meaning, the definitions are shown below.

When the item is specified "in boxes," it means that when corrugated and solid fibre boxes are used, they must conform in all respects to the specifications in Rule 41. This includes many patented or infrequently used boxes and the table from Rule 41 (p. 761), therefore, shows only the boxes in common use and not the unusual styles. Wartime pressure has been responsible for considerable progress in the development of new types of packaging, particularly in fibreboard containers. Details of most of these developments including specification for nailed and wire-bound boxes, can be ascertained through perusal of the most recent Army-Navy specifications.

The only other definition of "boxes" is found in the furniture classification where a box may measure up to 85 united in. on 200 test and 100 united in. on 275 test.

The words "bales" or "bundles" mean, in reference to corrugated or solid fibre boxes, that the weight and dimension limits may be disregarded provided that if the box is oversize or overweight, it must be "securely bound" with metal straps, wire or ropes. Sometimes bales or bundles are charged a premium of 20 per cent over the "in boxes" freight rate. The details of this ruling are too lengthy to repeat here but any shipper planning to use bales or bundles should first carefully read and understand Section 3-D of Rule 5 to make sure of using the package which shows the lowest net cost and freight rates as balanced against the cost for shipping an oversize or overweight box.

The term "in packages" is almost as lenient as the term "loose" and means in effect that no packaging requirements are imposed provided the carrier considered the package to be "reasonable and proper protection" under the wording of Rule 5, Section 1. Applied specifically to fibre containers the term "in packages" means that a box or wrapper may be used without regard to style, test, size, weight or sealing methods.

"Wrapped" is a term usually applied to furniture shipments and means that all finished surfaces and upholstered parts must be protected and wrapped in a choice of indicated materials, one of which is usually fibreboard. No restrictions are imposed regarding the style of the box, its strength or sealing methods. Often creased sheets or semi-boxes are used secured with metal straps.

Occasionally one encounters the term "in cartons—see note" and this usually refers to a specific exception which differs from Rule 41. There are many hundreds of such exceptions so that it is always desirable to look up the exact type of packing which regulations require for any new items you ship.

All fibre containers conforming to the Rule 41 definition of "boxes" must carry a circular boxmaker's certificate. If oversize or other containers not conforming to Rule 41 are permitted, a rectangular certificate is required with the name of the item included such as "Box for

Brooms." Packages containing fragile articles or articles in glass or earthenware must be marked "Fragile—Handle With Care" or similar precautionary marks (Rule 6, Section 2).

When used for LCL shipments boxes must either show description of contents or an identifying symbol or number which must be explained on the shipping order and bill of lading (Section 7-B). The bill of lading must also be endorsed: "The fibre boxes used for this shipment conform to the specifications set forth in the boxmaker's certificate thereon and all other requirements of Rule 41 of the Consolidated Freight Classification" (Section 7-C). Many new users of fibre containers have been puzzled by 20 per cent penalties assessed on the freight charges due to failure to endorse the bill of lading in this manner.

Dangerous articles—In the present connection the expression "Dangerous Articles" includes explosives, fireworks, ammunition, inflammable materials, corrosive liquids and poisonous substances. The regulations covering the shipment in fibre containers of dangerous articles are promulgated by and published by the Interstate Commerce Commission through the Bureau of Explosives and take precedence over all other freight regulations including every form of transportation. Naturally these regulations are more severe than for ordinary freight and are more rigorously enforced. The reason for this is obvious and in actual practice this strictness has paid big dividends in human safety and material savings.

For instance, in normal years 500,000,000 lb. of explosives are shipped over our transportation system and for a period extending well over ten years this shipment has resulted in no damages, no injuries and no death. The Bureau of Explosives was first created in 1905 and the complete regulations governing shipping containers may be secured in the form of a bound book by applying to the Bureau at 30 Vesey Street, New York. From time to time supplements to this book are mailed to subscribers and several times a year a docket is published listing applications for changes which have been requested by shippers or proposed by the docket. Reference to the Bureau of Explosives regulations will also be found in Rule 35 of the Freight Classification.

Effective January 7, 1941, the Bureau of Explosives was greatly simplified so that in place of the many specifications previously applying on fibre containers the new regulations concentrate all of these into one single group known as specification ICC-12B. Other minor specifications are still retained such as 12C and 12E which refer to patented and other seldom used containers. Among the simplifications effected in the new regulations was the elimination of ICC requirements for the shipment of paints, lacquers, etc., by freight (but not by express) and an increase in the weight limits for exemptions on certain other items. Shippers of dangerous articles should study these new regulations carefully as otherwise they may be using a container more expensive than required. Also the great national defense activities mean that many industries are shipping ammunition and other dangerous articles for the first time.

The Bureau is very strict in regard to its requirements for labels and markings. Certain boxes must carry a distinctive colored paper label. For instance, a red label is used for inflammable liquids and a yellow label for matches. These labels may be purchased from the Bureau or may be printed in the correct color on the container by the boxmaker. In other cases where no label is required the box must be printed, "No label required." This is especially true of freight shipments as most express shipments must carry labels. In addition nearly every item requires certain type matter on the box such as "Handle carefully," "Keep fire away," "This side up" and most often the name of the contents. The bill of lading and shipping order must also be endorsed with certain statements such as reference to label requirements. Cars also in some cases must be placarded. These details are of great importance.

Effective March 1, 1935, the Interstate Commerce Commission extended its jurisdiction over the shipments of dangerous articles on interstate common carrier motor trucks, which means that all the regulations applying on this merchandise when moved by rail freight must also be complied with for truck shipments. These truck regulations are also published by the Bureau of Explosives. This is not the case for non-dangerous articles.

At about the same time the Bureau also issued regulations covering the transportation of this merchandise on freight and freight-and-passenger vessels.

Motor truck—There are today no motor truck regulations covering the strength and construction of fibreboard boxes and theoretically any under test container can be used, in which case the truck would have a decided advantage over the railroad. Discussions are now under way with the object of developing uniform strength regulations for both trucks and rail freight.

Parcel post—The Post Office Department has not issued any blanket order containing specifications for fibre containers. Scattered through their other publications, however, will be found items where corrugated boxes are specifically recommended. These include valuable or breakable merchandise such as cigars, cut flowers, liquids in glass and the like. The parcel post regulations recommend the use of strong wrapping for outer packaging and since the post office looks on fibre containers as excellent answers to this requirement, a great many corrugated boxes are in daily use for parcel post shipments. In addition to offering protection, these boxes are easy to seal efficiently, are light in weight and make a good appearance. Such packages may not exceed 100 in. in length and girth combined. In measuring a parcel the greatest distance in a straight line between the ends is taken as the length and the distance around the parcel at its thickest part is taken as the girth. Shipments of liquids in glass are accepted up to certain definite limits but this does not apply on liquor. The limits are much lower on inflammable liquids.

In general the parcel post requirements are difficult to interpret and apply on new or unusual packages and in such cases the safest procedure is to submit such a package in its final form to the local postmaster before instituting shipments.

Wooden containers

Crates—The simplest form of wooden container is the ordinary crate. Actually the modern crate is not at all simple since an enormous amount of engineering study has been devoted to its structure in order to combine the maximum of strength with the minimum of expense. Much of this research was carried out by the Forest Products Laboratory at Madison, Wis., augmented by the engineering staffs of the larger producers of lumber and wooden containers. The Forest Products Laboratory has published its findings in a series of bulletins and all crate users should own and study these publications. Not only are the best designs illustrated, but valuable information is also given regarding the proper bind and use of nails for each size and style. This is of paramount importance inasmuch as the method of nailing often means the difference between a good crate and a bad crate. The general Freight Classification specification (Rule 40, Section 2) for crates is very brief, simply stating that they must be made of wood to protect contents on the sides, ends, top and bottom and so constructed that freight may be taken in or out of the car within the crate; that contents must be securely held within the crate, and that no part of the contents shall protrude. Surfaces likely to be damaged must be fully protected. A detailed description of crates for specific merchandise will be found under Paragraphs No. 530—568, inclusive, of the Package Descriptions, in the Classification.

Wood-framed containers—Progressing from the open crate, we come to the wood-framed container which can be considered as a crate with enclosed panels. These panels protect the contents from the weather, dust and outside contact. Originally these panels were made of plywood and many still are. Later, solid fibreboard and occasionally corrugated board were substituted for veneer in the interest of economy, lighter weight, and to furnish a surface for display printing. Typical uses are for shipping console radios, cabinets, textiles and other large objects which are not excessively heavy.

The freight specifications for wood-framed containers, either corrugated or solid fibre panels, will be found in Section 3 of Rule 41 of the Classification and specific styles are described under Packages No. 781, 785, 824, 839, 853, 874, 885, 888 and 915.

Wire-bound boxes—These are essentially wood-framed veneer boxes except that the patented construction permits them to be delivered KD as shooks and they have a lid which can be opened and reclosed. The ingenious use of attached wire reinforcement permits of considerable economies in cost and weight without sacrificing strength. Much of the income from royalty is plowed back into continuous research and sales promotion. Examples are the recent experiments in which fibre slats are combined with veneer slats and panels.

Wooden boxes—We now come to the old reliable standard wooden box. However, it also has received a lot of scientific study and has developed into many specialized forms for specific purposes. Thus, there are uncleated boxes, others with cleats either outside or inside and various forms of end framing. Some are tongue and grooved, others have lock corners, while special styles are built to order for many specific purposes. In all styles, however, nailing is of utmost importance. The nails must be the right size and kind and they must be driven properly. Here again the Forest Products Laboratory has contributed valuable scientific data which are available to anyone interested.

The railroads do not attempt a general description of wooden boxes other than to say (Rule 40, Section 1-a) that they must have "solid or closely fitted sides, ends, tops and bottoms securely fastened" and that (Rule 5, Section 1-a) they must be "in such condition and so prepared for shipment as to render the transportation thereof reasonably safe and practicable." Incidentally, this last clause applies on *all* shipments tendered for freight regardless of the container used. Detailed descriptions of wooden boxes for specific merchandise are under Packages No. 179—274, of the Classification.

Miscellaneous containers

The Freight Classification recognizes a number of other types of containers and a brief reference to them follows:

Baskets—These include baskets made of steel, wood, rattan, splint, bamboo, staves, veneer, willow and wicker. All of these and a few others will be found under Packages No. 146—169, inclusive, at the end of the Classification book.

Hampers—These are usually made of rattan or canvas, the latter sometimes being lined with wire netting. See Packages No. 602—606, inclusive, for details.

Marking shipping containers

The need for plain legible marking on containers is obvious, but too often ignored. For instance, great care should be observed in showing the correct state in which the town is located and writing or stenciling this state or its abbreviations should be done very legibly. The reason for this is the almost unbelievable duplication of place names in the United States. Thus, there are 88 towns by the name of Summit and 23 different city names occur in the United States over 20 times each. Other common examples are Washington, Springfield and Manchester. Mass. is often mistaken for Miss., Cal. for Col. and Me. for Mo. (See *Marking Shipments*, p. 809.)

The pressing wartime necessity for re-use of containers makes imperative the exercise of care in obliterating old markings. Devices and obliterating inks are available for the purpose. Stenciling devices of many kinds are obtainable, which have been approved by the carriers. Freehand lettering should always be carefully and legibly done. Special quick-drying inks are recommended to further this practice.

Cabinets—Packages No. 430 to 433, inclusive.

Carriers—This form of container is used for shipping such items as empty glass bottles, bananas, oysters and foods refrigerated with either water ice or dry ice. These refrigerated carriers are insulated. Carriers are often mounted on wheels. Details are shown under Packages No. 460 to 473, inclusive.

Trunks—Trunks are often used for such items as sales-

men's samples and are listed under Packages No. 714—718, inclusive.

Egg cases—Egg cases for freight are usually made in standard styles of wood although recently solid fibre and corrugated have been added. Detailed specifications will be found in Packages No. 511 and 512 while Package No. 893 describes the fibreboard case for shipment of small quantities.

Racks: .....Packages No. 690 and 691.
Reels:.....Packages No. 695 and 696.
Rolls:.....Packages No. 700—708, inclusive.
Tubes: .....Packages No. 720 and 721.
Trays:.....Packages No. 789 and 875.
Beams: .....Package No. 790.
Ballots:.....Package No. 768.
On Boards:.....Package No. 769.
Flasks: .....Package No. 774.

Shipments without containers

Any discussion of shipping methods must include the various methods of making "loose" shipments. At first glance this does not seem very complicated or scientific. Nevertheless, great strides have been made in recent years in the perfection of the various methods employed for loose shipping.

The original and obvious loose shipment consists of large bulky items, such as machinery, automobiles and other merchandise either too large to go in a container or else of such a character as to render a container unnecessary. Inasmuch as many of these items are nonrecurring and have their shipping and bracing methods worked out individually, it is not possible to cover them in an article as short as the present one. Also it is not desirable to discuss here the shipment of such bulk commodities as coal, grain, etc., except to point out that even here new developments are constantly being adopted such as the carload shipment and handling of bulk cement, molten asphalt, fluid milk, acids and various chemicals.

Of chief interest to us, however, are the many novel methods being used as an intermediate stage between bulk and package merchandise. The modern scientific study of metal strapping and its uses has been one of the chief contributing influences. The proper use of metal strapping has developed within recent years a whole new technique in loading and bracing merchandise in freight cars. One development is referred to as "unit loading" wherein the contents of a freight car are divided into units which, in turn, are held together with metal bands or wires. No other bracing is used, and the "units" may shift in the car, thus reducing the dangerous effects of any severe impacts.

In another method, known as an "anchored" load, the load is stowed in the car in the usual manner and held back and braced by metal bands or wires which are fastened or anchored to the walls of the car at least 3 feet back from the face of the load. The bands or wires extending from the anchors are brought around the front of the load, tensioned and then sealed. Sometimes when the nature of a load requires, a wooden gate is placed in front of the load and the bands sealed against it. As a result, greater economy and efficiency have been made in the C/L shipment of such merchandise as automobile frames and other chassis parts, rolls of paper, sewer pipe, drums, barrels, crates and similar items. Other modifications of these methods are "bulkbinding," "anchor strapping" and "Conbur bracing."

Complete technical information and assistance is readily available to all shippers on application to the manufacturers of metal strapping or to the various railroad and government agencies such as the Freight Container Bureau (Conbur), the various Shippers Advisory Services, the Transportation Division of the Association of American Railroads, the Mechanical Division of the A.A.R. and the Forest Products Lab. at Madison, Wis.

The Freight Classification also gives much detailed information on this subject under Packages No. 478—485, inclusive, and 625—655, inclusive. These include methods of bracing and protecting such loose items as pianos, canoes, bottles, building tiles, crucibles, sewer pipe (including the "double unit method") and others.

Bracing

Great improvements have been made in methods of bracing, dunnage (see Rule 30 of the Classification), protection at car doors and proper storage in the car. Consult the Transportation Division of the A.A.R. for their voluminous illustrated data. A notable and extremely recent development involving the lastest technique in metal strap bracing has been the skillful methods worked out for the boxing and securing of aircraft for rail transportation on flat cars. Two different companies are now specializing on this from a nationwide standpoint.

Skids and pallets

This is another interesting method of shipping which lies between loose handling of materials and complete packaging. It probably started in the paper industry where several hundred pounds of sheets were loaded onto a plain wood skid, wrapped with waterproof paper and securely strapped to the skid for shipment to the printer. Other industries, notably the manufacturers of automobiles and electrical goods, were quick to realize the advantages and economies of this method of transportation and are now using it wherever possible for shipping such items as small motors, wheels, bumpers, clutches, mufflers, fire brick, etc. Additional advantages are the speed with which these skidded units can be handled in or out of the freight car and the convenience of storing.

Simple skids are also used in combination with fibreboard for the protection of heavy objects of a fragile nature such as furniture, refrigerators, ice cream cabinets, etc. Some of these are described in the Classification under Packages No. 678 (refrigerators), 710, 711, 712 (using insulated blankets), 752 (telephone booths), 754 (furniture) and 824 (refrigerators).

Another modification is that of strapping several items together without a skid and without any outer container although it is sometimes desirable to have protection between the items.

Corrugated and fibre shipping boxes

by R. L. Beach

The general subject of corrugated and solid-fibre shipping containers has been quite thoroughly covered in previous issues of the PACKAGING CATALOG. These have fully described the styles of fibrewood shipping containers, the nomenclature of the industry, the specifications of the Official Classification Committee and of some of the war procurement agencies, and the advantages of fibre shipping containers for general shipping purposes within certain limitations.

There has been little published literature, however, on the wide variation of the different available grades of corrugated and solid fibreboard, the reasons for this variation, and the characteristics of the grades which make their use desirable for the protection of certain specific products.

According to Department of Commerce estimates, the total production of corrugated and fibre shipping cases amounted to 4,123,000 tons in 1944, an increase of perhaps 32 per cent over what might be considered a normal year. (See Table, *Production of Containers and Closures*, p. 95.) A considerable percentage of the boxes now being produced are of the water-resistant V-type board for overseas shipment by the war agencies. This type of box may be considered one of the top packaging achievements of the war because it provides a degree of protection never before supplied by any one kind of shipping container. Early in its development, the problem of corrosion of tin containers shipped in V-boxes became quite serious. Investigation resulted in recommending among other things drying of empty boxes before loading, reduction of moisture content during fabrication of boxes, and use only of asphalt liner board. When war needs relax, the cost of these V-boxes may prevent general use for civilian shipments, and we shall probably see a return to the types of boxes which have been in use for many years for domestic shipments.

The grades of board, design of containers and interior packing requirements for the war-essential products will, to a great extent, be the same as for containers used for civilian requirements before and after the war. Therefore, any discussion of the service requirements of shipping containers, and how these requirements can be met by selection of the proper grade of board and the proper container design, applies as well to the future needs of industry as it does to its requirements under present wartime conditions.

A large number of these boxes will be used for food and related commodities, and their design and materials have become well standardized through years of shipping experience. There will be, however, hundreds of thousands of fibre containers used for new purposes.

Very considerable knowledge and skill will be required in the selection of the proper type of board for these containers, and much care will be necessary in the design of the interior packing pieces or whatever other forms of cushioning might be employed to do the particular job.

Service requirements of fibreboard

As has been previously stated by many authorities, the service requirements of fibreboard shipping containers come under three general headings: first, retention of contents; second, resistance to compression (top and ends); third, resistance to puncture.

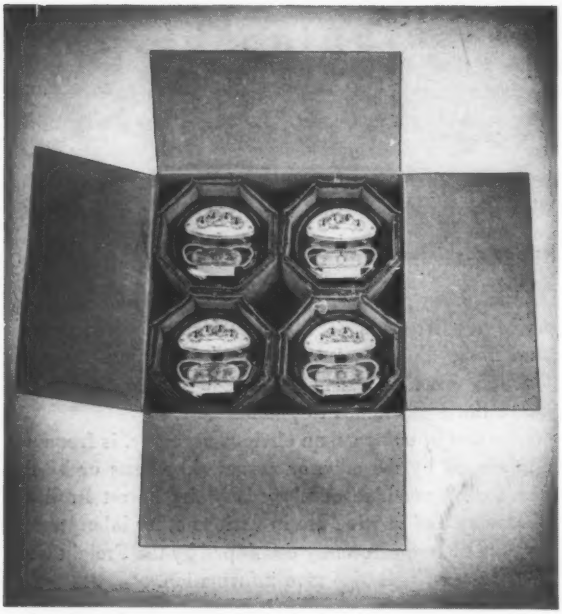
Retention of contents, an obvious necessity, is frequently measured by the edge or corner drop tests or by the drum-testing machine developed by the Forest Products Laboratory and in wide use in various other laboratories. The Conbur tester, recently developed by the Freight Container Bureau, will also give information.

Resistance to compression in a container is necessary in order to permit stacking in warehouses and to withstand successfully the shocks of transportation—particularly from end to end—when loaded in freight cars. This resistance is measured by any one of the several types of compression-testing machines of suitable capacity available from various manufacturers, and in general use.

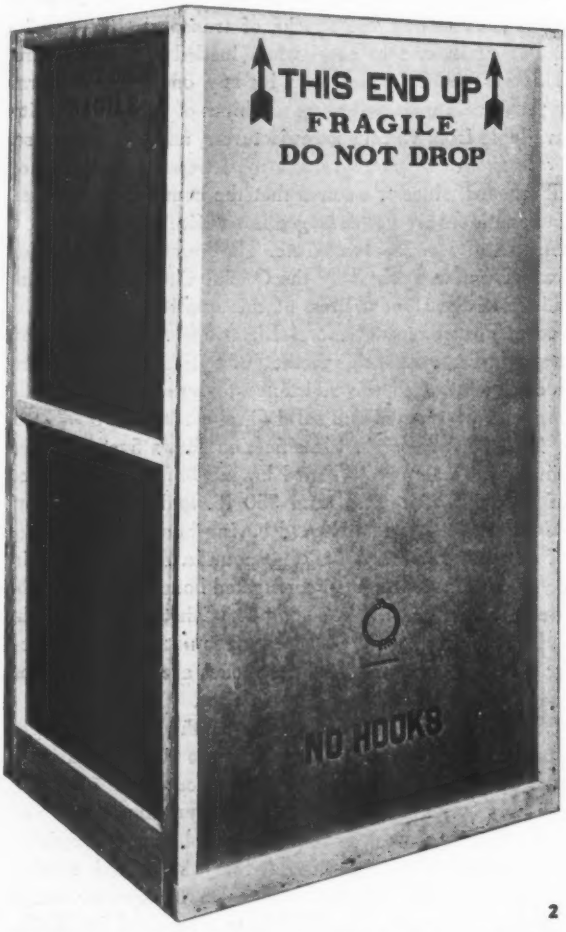
Resistance to puncture is a most important quality of fibreboard, since it ensures that the commodities packed in containers are not damaged in transit by sharp articles, corners of wooden boxes, etc. The bursting test has for years been recognized by the Official Classification Committee as the standard test of this quality. However, the recently introduced General Electric boxboard puncture tester indicates that this method of testing may be a more accurate index to the resistance to puncture of a wide range of corrugated and solid fibreboards.

The Official Freight Classification shows five grades of single-wall corrugated board having bursting-test values of 125, 175, 200, 275, and 350 lb. and five grades of double-wall corrugated board having bursting-test values of 200, 275, 350, 500 and 600 pounds. Also, for certain commodities, double-wall corrugated boxes testing 900 lb. are approved (Package No. 808, Consolidated Freight Classification, No. 15), although it is not known whether or not such extremely high-test boxes are being used for these commodities at the present time.

The bursting-test requirements of the Official Freight Classification from 125 lb. minimum to 900 lb. maximum would indicate that grades of fibreboard are available having a strength value through an approximate range of 1—7. However, work at the Institute of Paper Chemistry at Appleton, Wis., indicated that the actual service strength of fibre containers covers a far greater range than the 1:7 ratio. This subject was reported by Wells, Kaplan and Ayers at the annual meeting of the Technical Association of the Pulp and Paper Industry, February, 1943. In a preliminary way, their report covered a very thorough investigation of the comparative strengths of a



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1—Suspension cushions are formed by corrugated board wrapping watt-hour meters packed in shipping containers made of corrugated board. 2—Cleated fibreboard shipping containers such as this rate high in service requirements. All photos in this article, General Electric Co.

limited number of grades of board measured by the machines described in the foregoing, and others like them.

So far as is known, there has as yet been no study, by the various types of measuring apparatus available, of the comparative strengths of the entire range of board and boxes from the lightest bursting-test grade to the heaviest. However, any designer of fibre containers can safely assume that the ability of the heavier grades of board to meet service conditions will be ample when properly designed and tested by recognized laboratory methods or actual shipping tests.

A recognition of the wide variety in quality of the standard grades of fibreboard explains why fibreboard boxes are definitely suitable for commodities having vastly different protection requirements. On the other hand, failure to recognize the qualities of the standard available grades of fibreboard and their proper utilization has been one of the chief causes of some disastrous experiences in shipment. The mere selection of a heavier and more costly grade of board for a container, because of unsatisfactory experiences with a previously used container, does not ensure that the redesigned container will prove more suitable unless the causes of the original failure are analyzed and a proper grade of board is used.

Cushioning

One of the most frequent causes of trouble commonly known as "concealed damage" is the breakage of more or less fragile articles. In general, this damage is caused by lack of proper cushioning directly around the article itself or lack of properly designed interior packing. In this case, the substitution of a heavier and better grade of corrugated board for the shipping container will not correct the trouble.

Frequently mention has been made of the suitability of corrugated containers for articles of a more or less fragile nature because of the cushioning quality of corrugated board. This is too general a statement to help in the selection of the proper grade of board for a fragile article, since cushioning is a variable quantity, depending upon the weight of the article and the amount and velocity of movement. That is, a material which might provide most excellent cushioning for an object weighing a few ounces would be valueless for an article of the same size weighing several pounds.

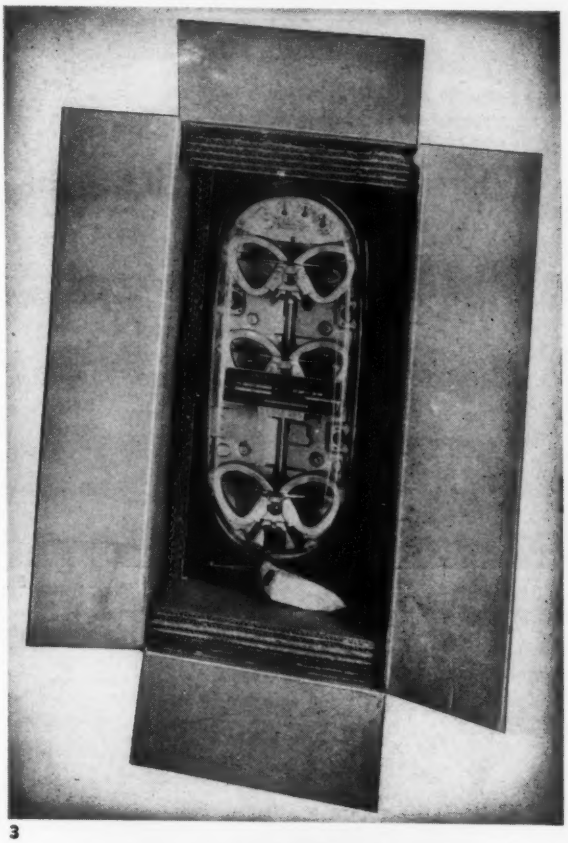
To date no instrument is commercially available for measuring cushion, although several laboratories have developed experimental apparatus for particular problems. While it is generally recognized that even though the cushioning quality of corrugated board depends basically on the corrugated sheets, it is nonetheless a fact that the degree of cushioning of any particular grade of corrugated sheet varies according to the weight, thickness and stiffness of the linerboard with which it is combined, and is *inversely* proportional to it. In other words, the lighter the grade of liner, the greater will be the degree of cushioning, other factors being equal. The reasons for this are not well understood, and will not be until exhaustive study of a larger number of boards is made by some type of apparatus yet to be developed.

Since the degree of cushioning inherent in a piece of material cannot at present be measured, the container, completely packed with its contents and ready to be shipped, must be tested as a whole in order to determine the proper materials to use both for interior packing and for the container itself. This can be done by the use of the drum tester, the Conbur tester or by drop test from various heights. These tests, however, must not be run to the point where the container itself fails, or the information desired on the degree of interior cushioning will probably be destroyed.

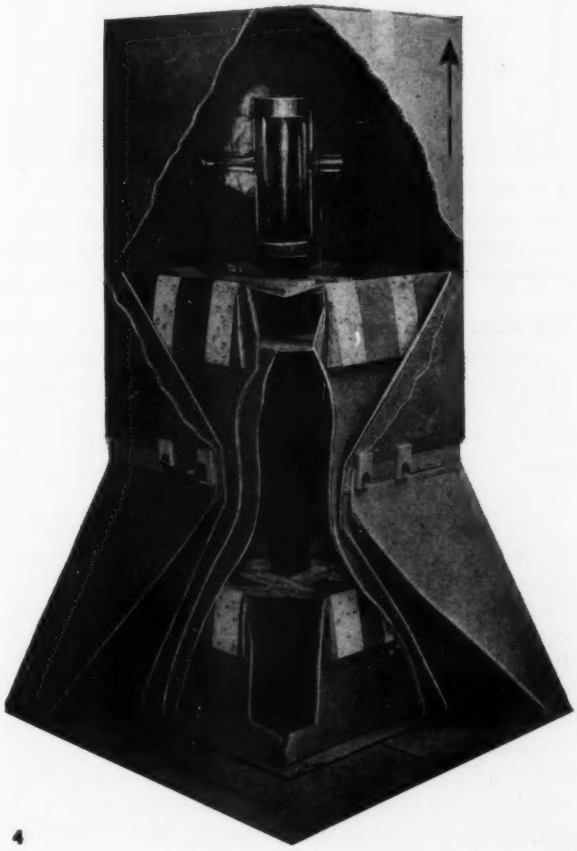
It should not be assumed, therefore, that for the shipment of any article susceptible to damage by concussion, the mere use of a corrugated container is all that is necessary. Because of the weight or size of the article, it may be necessary to use a comparatively high-test grade of corrugated board which cannot be relied upon to provide the necessary degree of cushioning. In this case, in order to protect the article from damage caused by shock, it is necessary to obtain the required degree of cushioning by proper interior packing. It should also be kept in mind that all of the corrugated boards obtainable for boxes are also available for interior packing pieces In addition, it may be noted that any combination of these may be utilized.

Incandescent lamps provide one of the best examples of large-scale use of corrugated board for the shipment of light articles. When packing the regular household sizes, individual lamps are enclosed in a single-face corrugated wrapper, both the corrugated and the facing sheet being of a comparatively light weight, but strong grade, of paper. Six of the individually wrapped lamps are then placed in a single-face corrugated wrapper, and several of these large cartons are then enclosed in a corrugated shipping container. This container does not have to meet a bursting test, since the specifications given for Package No. 256 of the Official Freight Classification, No. 15, stipulate that if the dimensions do not exceed 60 united inches and the maximum gross weight does not exceed 20 lb., no such test is necessary. This is an excellent example of the use of multiple layers of lightweight corrugated material to provide adequate cushioning, one which by tests and the actual shipments of millions of lamps has provided most adequate protection.

The extreme opposite of this type of packing is that specified in the Official Freight Classification for "Radio or Talking Machines Without Mechanism, Console Type," as outlined in Package No. 835. This ruling specifies that not only must the shipping container test not less than 350 lb., but, in addition, the corrugated pads used for interior packing must test not less than 200 lb., the corners of the container must be reinforced, and the cabinet suspended by means of corrugated fibreboard testing not less than 275 lb., so that the legs are free from pressure. This specification recognizes the rigidity of corrugated

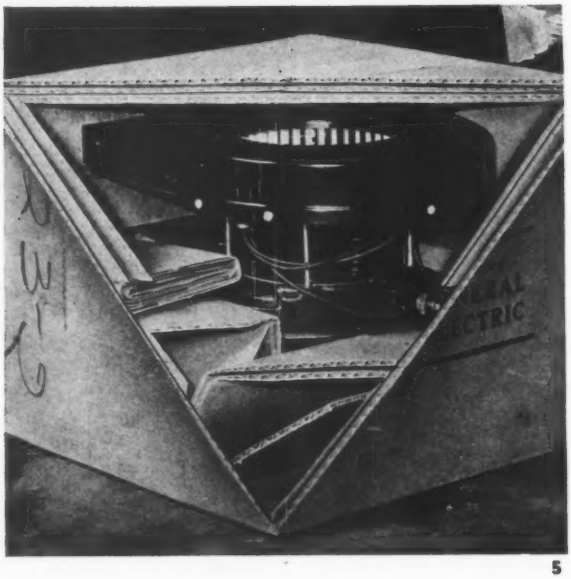


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3—In this case, corrugated board is the material employed for the interior packing which cushions a moderately heavy and very delicate instrument. 4—Cut-away view of a corrugated container showing how the interior packing is arranged for the cushioning of electronic tubes.



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5—Proper grade selection and proper container design are essential. This motor compressor is supported by corrugated board arranged within corrugated shipping container. 6—Standard household incandescent lamps are protected from concealed damage by use of corrugated board.

board and makes use of it where such a quality is required.

Between these two extremes are built up the specifications covering the packing of thousands of articles of varying weights, dimensions and fragility, and the proper balance between cushioning, rigidity and resistance to tear is worked out for each particular item according to the amount of each quality needed.

The Official Freight Classification in Rule 5, Section 3, provides that under certain conditions commodities acceptable for shipment in bundles may also be shipped in fibreboard boxes not conforming to Rule 41 of the Classification. In general, the service quality required in boxes for such articles is a high value of retention of contents, since these articles are frequently sharp, loosely packed and of high density. Consequently, the corrugated boxes frequently fail by splitting at the scores and spilling the contents. Usually, no particularly high resistance to compression is necessary in the case of containers for these purposes.

War and postwar fibreboard

The requirements of the armed forces for fibreboard boxes for overseas shipments have led to the development of both corrugated and solid fibreboard of far higher test strength, no matter how measured, than ever obtainable heretofore. Irrespective of how the rules of the Freight Classification Committee may be modified after the war to take advantage of the available higher strength fibreboard boxes, undoubtedly as soon as the V-boxes are no longer needed for military requirements they will come into wide use for both domestic and export shipments of articles previously considered as impossible to ship in fibreboard containers. The exact service strength of these containers as compared with the best grades of regular domestic containers is not yet known, but it is very appreciably higher, and should result in their expanded use.

It is quite probable that an expected wide postwar use of fibreboard for shipping containers will be in the form of cleated fibreboard boxes, or as they are defined in the Freight Classification "Crates, fibreboard lined." With this form of construction, the requirements for resistance to compression and retention of contents do not depend to any extent upon the strength of the fibreboard, but are met by the edge cleat specifications, that is, cleat dimensions, corner construction, nailing, etc. The fibreboard panels are required to protect the contained articles from damage by puncture only, a factor easily taken care of by the selection of a suitable grade of fibreboard.

In addition to the increased strength characteristic of this type of container, it also has the very distinct advantage over a slotted carton container of being easier to handle in warehousing and carloading. This is because the external cleats provide means for obtaining a firm hold on the container, either by hand or crane hooks. For boxes of over about 50 cu. ft. capacity, this is a very definite advantage.

Before the war, this container was coming into use to a considerable extent for such articles as refrigerators, office furniture and large cabinets. Its use would probably have become more widespread had not box manufacturers lacked the facilities to fabricate the shooks, and box users lacked the nailing equipment. The many advantages of this type of container will undoubtedly result in manufacturers and users obtaining the necessary equipment as soon as possible after the war. Consequently, the tonnage of fibreboard used for such containers will undoubtedly be considerable.

The present wide use of fibre containers—and the probable future growth of the industry—is largely due to the many grades of material obtainable and the ease with which it may be fabricated into various forms of shipping containers and interior packing. Obviously this has made it possible to design complete packing units for products having widely different characteristics.

The growth of the industry has been very great in the past decade, but because of the demand for serviceable, lightweight packing to meet anticipated shipping conditions, it probably has been small in comparison with future expansion.

Steel barrels and drums

by R. W. Lahey

All cylindrical metal containers of 10-gal. capacity and larger are classified as drums; both single-trip and returnable (multiple-trip) packages are included.

There was more steel available for the manufacture of steel barrels and drums in 1943 than in the two preceding war years. This, combined with a reduction in the demands of the armed services and other government agencies, has eased the acute shortage. In the fall of 1943, consideration was given to the removal of all restrictions on the use of steel drums but war developments in Europe prevented any such change. The extent of the supply of these containers in the current year will be determined by the need for steel and manpower in our vigorous prosecution of the war.

Government restrictions and specifications

The allocation system under which the drum industry operated was replaced in May, 1943, by a quota order under the same number L-197. This order contains a list of commodities (Schedule B) which cannot be packed in steel drums—new or used—unless for export shipment. Certain products included in this list may be packed in used steel drums but the authorization does not extend to "seconds" or "rejects." Products which may be packed in new drums are listed in Schedule A of the order. The quota is calculated from the pounds of steel used in containers which were packed in the base period as set by the WPB. The quota is therefore expressed in the weight of steel that may be used in the fabricated steel containers. Unused quotas from the previous quarter may be carried over. In addition, 25 per cent of the next quarter's quota may be borrowed if needed. Quotas may not be interchanged between classes of commodities. Certain products packed in fibre drums in 1943 may be packed in steel drums in accordance with the percentages authorized by the order.

If a user has no quota, he must file an application for establishment of a quota in form WPB 3770. The same form should be used for appeals to increase quota.

Inventories of unfilled new drums are limited to the next 60 days' requirements or to 1½ carloads, whichever is greater.

Drums previously used for packing edible products and naval stores must be kept in these services as long as they are usable.

The Army and Navy published, on Feb. 15, 1943, specifications for drums for packing overseas shipments. (U. S. Army Spec. 100-14A and U. S. Navy Spec. 39P16a). Anyone interested may have copies from Army or Navy.

Changes in construction

No major changes in construction of steel drums have been made during the past year. However, one improvement, started a few years ago, is worthy of mention; the infrared oven has been used for baking drum coatings with very satisfactory results. It has been found that baking times can be reduced and tougher more uniform coatings result.

Reconditioning

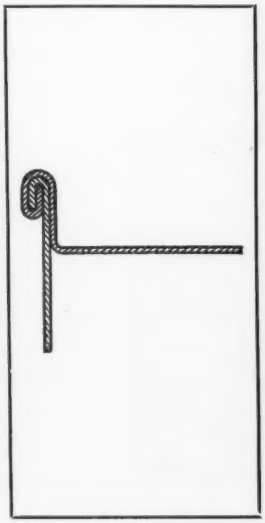
The shortage of drums has changed the classification of most liquid containers from single-trip to returnable

1—Steel drums are widely employed for transporting of liquids. This one is 18 gauge, has a capacity of 55 gallons. Note corrugation in the cylinder, the expanded rolling hoops and mechanically pressed openings. 2—Diagram of double-seam construction for locking heads and cylinders of metal drums. 3—Hackney seamless bilge barrel. Note locking head and the smooth inner surface of this barrel. Photo, Pressed Steel Tank Co.

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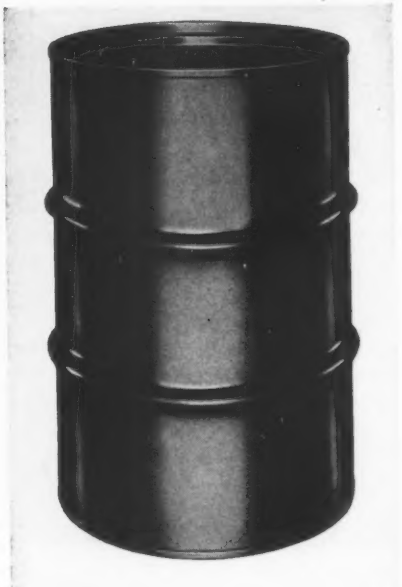


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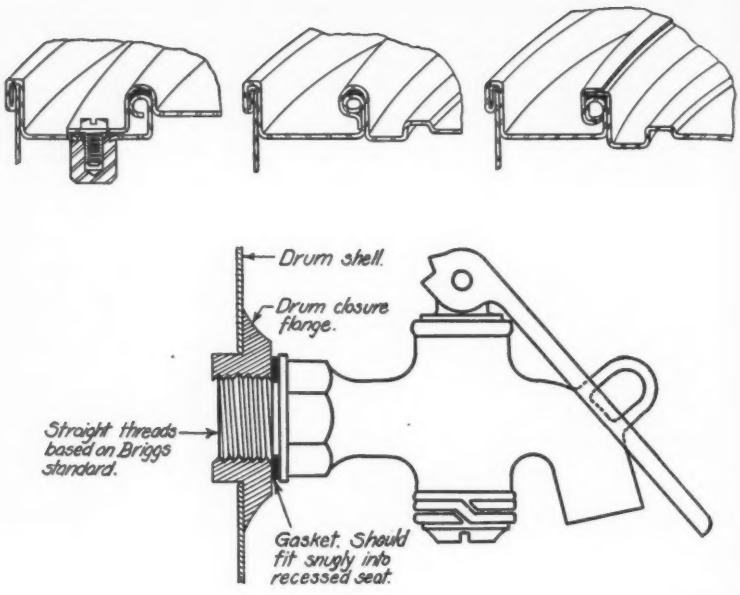


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4—This 55-gal. drum, made of 18-gauge steel, was designed for the shipping of pastes and of semi-liquids. Photo, Stevens Metal Products Co. 5—Diagrams of essential parts of steel drums. Drawing at the upper left shows construction of bolted cover; one at center shows lug seal; drawing at the right is a ring-seal cover. The lower diagram illustrates the essential parts of a lock faucet for dispensing contents of steel drums.

containers. This has caused shippers to install cleaning equipment or to employ the services of reconditioners do this work.

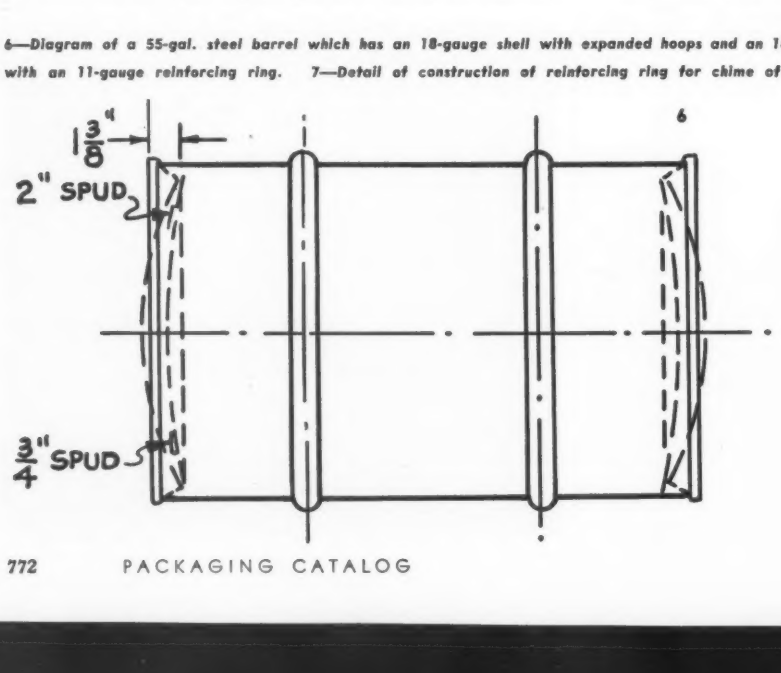
Equipment for reconditioning should include provision for washing, air testing for leaks under water, drying, repairing and painting. Repairing includes welding of small holes, removing large dents and—in some instances—replacing leaky flanges. The choice of cleaning equipment is dependent on the number of drums to be cleaned and the degree of protection from contamination that the product they transport requires.

Reconditioners prefer to grade down drums rather than to spend extra time cleaning and repairing. If the drums are used for transporting dangerous articles, and permission has been obtained from the Bureau of Explosives for the re-use of ICC specification single-trip containers, they must be tested for leaks with air pressure—as required by the specifications—before they can be refilled and shipped again.

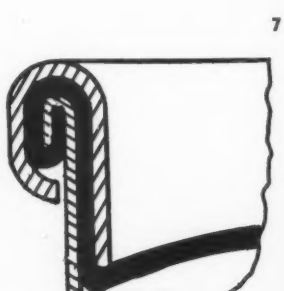
Returnable drums—16 gauge and heavier

There drums are, as the name implies, of rugged construction, built to withstand transportation abuses and for long life. They are manufactured in sizes of from 10- to 110-gal. capacity, and are specially constructed to meet the individual requirements of each product to be shipped in them. They are designed to provide for the safety and convenience of the men who must handle them.

6—Diagram of a 55-gal. steel barrel which has an 18-gauge shell with expanded hoops and an 18-gauge head and bottom. The chime is reinforced with an 11-gauge reinforcing ring. 7—Detail of construction of reinforcing ring for chime of a steel barrel. Diagrams, Wheeling Steel Corp.



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The majority of these containers are fabricated from 12- to 16-gauge black steel sheets which, when required, may be sheet or "hot dipped" galvanized, tin dipped or terneplated. They may be lined with rubber, lead bonded or lined with light-gauge chrome-nickel-steel or aluminum sheets. Drums are also made of solid aluminum, chrome-nickel-steel and nickel, depending upon the product to be transported in them.

These heavy returnable drums are made in both the full-open-head and tight-head types. The former are popular for packing dry materials or semi-liquids. The covers of these drums are usually held in place by metal rings, equipped with lever locks or bolts.

The tight-head drums are usually equipped with two small, screw-threaded openings, one ¾ in. in diameter and one 2 in. in diameter. These openings are also available in the 1½-in. and 2.3-in. diameters. The latter has a special jumbo thread which is used for drums containing acids and other corrosive materials. Forged steel flanges are best, and they should be welded into the drums. The Metal Barrels and Drums Committee of the Manufacturing Chemists Association has developed a new drum plug and wrench which should be available to users during the year 1945.

Bilge barrels are fabricated by cold drawing of the metal or by forming the cylinder with butt-welded joints. Bottoms are welded or brazed, and inside bottom crevices are closed by fillet welding. Lighter gauge metal can be used in the fabrication of the butt-welded drums.

Straight-sided drums are usually constructed with welded body seams. Heads are attached by double seaming or welding, and both types are generally supported with 12-gauge chime rings. One special type is fabricated from two cold-drawn seamless cups which are welded together circumferentially. Both head chimes are protected by welded rings. "I" bar rolling hoops serve to protect the side walls and facilitate handling.

These containers should be shaped to allow complete drainage. Any crevices in the chimes or depressions in the sidewalls or heads—such as beads adjacent to the rolling hoops or flanges—will collect foreign materials and thus will result in greatly complicating the cleaning operations:

Returnable drums of 55-gal. capacity are the maximum size recommended. Large drums are too heavy for safe or economical handling. The chemical industry standardized on the 55-gal. size for liquids. The only other size used in this industry is 5 gal., classed as a pail.

Returnable containers for dangerous articles must meet one of several ICC specifications depending upon the classification of the products they transport. The 5 and 42 series specifications are for liquids, and the 6 series for materials of the solid type. Consolidated Freight Classification Committee Rule 40, Section 5C, governs the construction of this type of drum when used for the transporting of non-dangerous articles.

Steel drums—18 gauge and lighter

The 18-gauge, 55-gal. drum is the most popular steel container for transporting liquids. Before the emergency, it was the general practice to use these drums as single-trip containers—the customers either re-used these containers or sold them to reconditioners. These drums are now recaptured by the original shipper for further service unless the return trip is too great. Rule 40, Section 5C, of the Consolidated Freight Classification Committee provides the specifications for these returnable containers when used for transporting liquids that are not dangerous. ICC Spec. 17C, 17E and 17X govern the construction of these drums for single trips only when they carry certain liquids authorized by the ICC Regulations for the Transportation of Explosives and Other Dangerous Articles. Special authorization can be obtained on application to the Bureau of Explosives for the re-use of these drums for transporting dangerous articles.

The construction of these drums includes electrically flash-welded side or body seams. The heads are secured to the bodies by double seaming. A compound of animal glue or rubber is used to make this joint liquid-tight. Rolling hoops are expanded or rolled in the bodies to facilitate handling. Series of corrugations are often rolled in the sidewalls between the rolling hoops and the heads.

Open-head drums containing levers or bolted closing

8 & 9—An 18-gauge, 55-gal. steel drum with ring and lever closure is now re-used by shippers. Photo, Stevens Metal Products Co.

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rings are usually used for packing heavy liquids, greases and the like.

Tight-head drums are equipped with pressed-in flanges and these openings may be obtained in ¾-in., 1½-in. and 2-in. sizes, and be inserted into the drums at any practical locations. Where necessary, portholes are used for complete drainage. The plugs are of the screw-thread type and are equipped with gaskets fabricated of rubber, asbestos or other satisfactory material. Metal cap seals, which are crimped over these openings with the plugs in place, are popular because they are tamperproof and afford secondary seals.

Drums holding dry materials differ in details of construction from the liquid containers. They are usually fabricated from 18- to 30-gauge steel. Drums of 28 gauge and lighter metal are used for packing hot liquids which solidify upon cooling and thereby support the containers. Usually 26-gauge steel is required for drums carrying loads up to 100 lb., 24-gauge for loads up to 200 lb. and 22-gauge for loads up to 350 pounds.

These drums are usually made with Gordon Lock or lap-welded side seams, of which the latter is stronger. Spot welding at intervals along the Gordon Lock seams adds to their strength. The heads are secured to bodies by the usual double-seamed joint. Sidewalls are stiffened by rolled or expanded corrugations of varying sizes.

Drum openings

Of the variety of openings which have been devised for these containers, the most popular types are described below.

The friction lid is most commonly used as it is an effective closure if the bearing surface between the head of the drum and the cover is sufficient to provide a tight fit. A depth of ⅝ in. is adequate. Lids vary in diameter from minimum of 4 in. to a maximum of 15 in. Covers of this type are usually held in the drums with three or more turnbuckles. Small holes in the ends of these turnbuckles are used to hold them in position by wiring them together. Lead seals can be applied to the wires for tamperproof closures. Friction covers are sometimes reamed or expanded. This makes an extremely tight closure, but once the lids have been removed, they cannot be used for effective re-seals.

The bolted cover is usually specified for containers holding pastes and other semi-liquids and powdered materials where large openings are desired. These lids are secured to the drum with machine screws. Gaskets are required for this cover.

The full-open heads are held in place with metal closing rings which are drawn tight with levers or bolts. The heads of these drums are sometimes fabricated of heavier metal than used in the bodies of the containers.

The lug cover is invariably used for closing grease drums. A sealing tool crimps the lugs under the curled portion of the heads. The user must pry out each lug with a screw driver to open the drum.

Drum linings

Light-gauge drums used for liquids or dry materials may be "hot dipped" or sheet galvanized, tin dipped or lacquer lined to prevent contamination. There are many coatings available for lining welded side-seam drums and these must be baked at high temperatures. Sometimes double linings are required. These linings have enabled the use of steel containers for materials which formerly had to be packed in containers made of wood, glass, aluminum, or in other materials.

Drum painting and decorating

Drums can be painted in one or two colors and can also be printed, lithographed and even embossed. A proper choice of colors will result in distinctive and attractive containers.

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10—*In the manufacture of steel drums a sealing compound and five thicknesses of metal, which are firmly contacted, make a tight seam. For additional strength, a reinforcing hoop may be applied over the chime. Photo, Socony-Vacuum Oil Co., Inc.*

Fibre drums

by R. W. Lahey

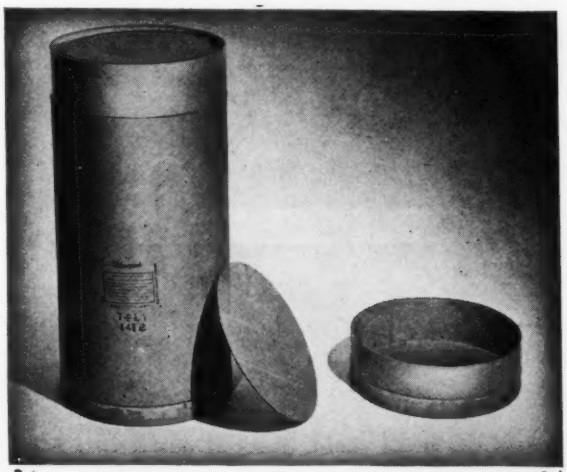
A heavy burden has been placed on fibre drum manufacturers during the last few years. Government and industrial requirements have resulted in a rate of production far in excess of any previous expectations. But this was not all—replacements for metal containers were needed to hold liquids, solid poisons, solid inflammables, greases, hydrogenated oils and many other products difficult to pack. Each of these demands required changes in the prewar container of a more or less radical nature. A good example is the 5-gal. fibre container for oleoresinous paint. This required complete reconstruction of the heads, liners, etc., in order that such containers could be made liquid-tight.

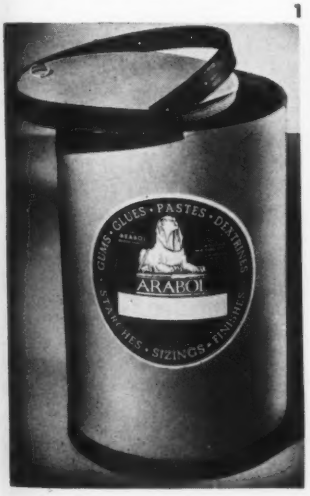
This industry has met the demands by offering drums for packing heavy liquids, greases, oils, inflammables, etc. Most of these containers are of the standard solid-fibre, convolutely wound construction. A few solid-fibre, spirally wound drums in the smaller sizes have been placed on the market. Most of these new developments have not been in service long enough to prove that they will successfully meet the many transportation abuses they must withstand. This is a very interesting, and at the same time, critical period for fibre drums. The success of present developments will probably have a great influence on the place which such containers will occupy in the postwar era. These accomplishments have been achieved in the face of certain prohibitions which have been placed on the use of such materials of construction as aluminum foil, Pliofilm and the like, which were widely used in the prewar era for lining fibre drums.

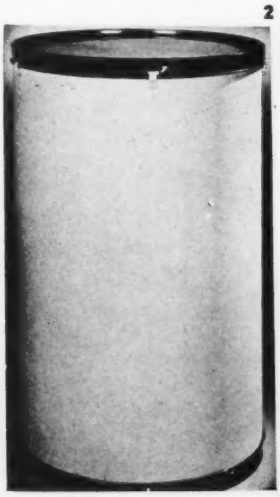
Fibre drums are used to ship a large variety of products ranging from inexpensive asphalt—which is poured hot, directly into the drums and then solidified—to pharmaceutical products such as vitamins worth several hundred dollars and packed in one drum. The list is much too long to give, but some of the highlights are cyanides, sulfa drugs, explosives, many food products, etc.

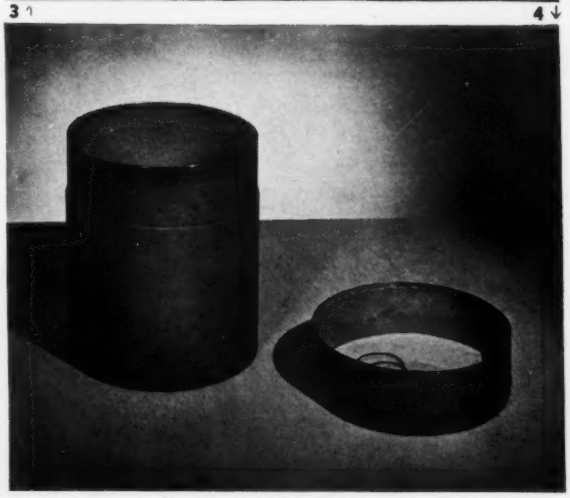
Naturally, the question of the extent to which fibre drums will remain arises, and the answer is more or less a matter of economics. Some products, because of their nature, will return to metal as soon as that is possible. For products which could use either container, however, the decision will be made on the basis of cost of material, handling and the possibilities for re-use.

The purchase and use of fibre shipping drums is now controlled and regulated by the War Production Board









1—Laminated, convolutely wound drum has ¼-in. kraft walls, wood top and bottom, metal-flange lock top and choice of coating. Photo, Carpenter Container Corp. 2—Lightweight fibre drum for bulk shipping of dry products. 3—For adequate protection, vitamins for export are first packed in 5-gal. cellulose-acetate lined Fiberpak drums with protective, transparent cellulose-acetate inner cover permitting view of contents. 4—Outer Fiberpak drum is used to ship two of the drums above, has steel rolling chimes. Photos 2, 3, 4, The Container Co.

under Limitation Order L-337 and Preference Rating Order P-146. The former lists the products permitted to be packed in fibre drums, and the latter gives the preference rating to be used when ordering drums for these specified products. Fibre drum users are still restricted to a maximum inventory of sixty days.

The shortage of these containers led some manufacturers to efforts to recapture drums from their customers. These used containers are cleaned and often minor repairs are made before they are re-used. If heads or closing rings are damaged, they can be replaced with new parts, obtainable from the drum manufacturers.

The necessity for re-use has resulted in greater care all along the line. Many firms which use fibre drums have instituted regular educational campaigns, teaching their customers how to use fibre drums in such a manner as to prolong their life of usefulness.

Like all other types of containers, fibre drums will give their best service when properly handled.

1. Drums should be moved by canting and rolling on their bottom chimes. Sidewalls, although adequate in strength, should be protected from puncture or crushing by sharp objects.
2. The best type of handling equipment is the four-wheeled dolly. Skids or pallets, transported by lift trucks, will not damage the drums. Two-wheel hand trucks may be employed satisfactorily for short hauls and occasional handling.
3. Filled drums should never be dropped to the ground from the tail boards of motor trucks. They should be lowered on two or more skids, each of which is at least 4 in. wide. Narrow skids will cause excessive pressure on small areas of sidewalls which may cause distortion and thus shorten the life of these containers.
4. Certain precautions should be taken in bracing of carload and partial carload shipments to prevent gates or strapping from resting against the fibre sidewalls. All braces should rest against the top and bottom chimes. If braces cannot be located at these points, sidewalls should be protected by vertically placed wooden cleats which extend over the entire height of the drums. Drums should be packed tight from one end of the car to the other, in nested rows. Some constructions can be transported without bottom chimes riding up on sidewalls of adjacent drums, if every other row across the car is upended. Wooden bracing or steel bracing of the stationary or floating load systems will prove adequate if these precautions are followed.
5. Slings used in loading vessels should be of the platform, canvas or net type. Drafts should be built up in slings to prevent excessive pressure.

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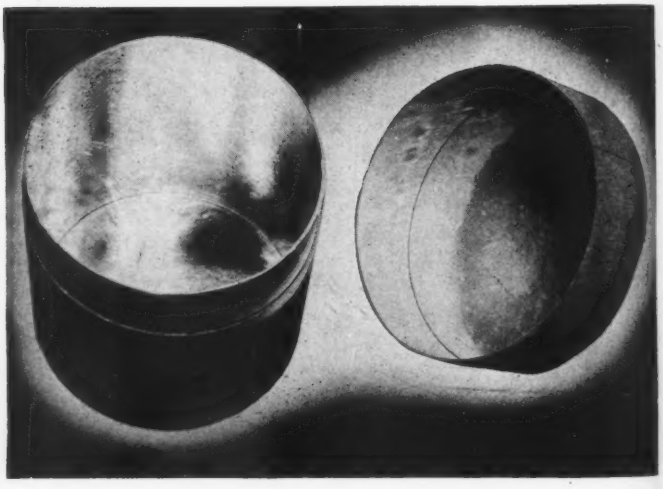


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5—Similar to concrete construction molds both in material and in method of manufacture, is this war baby of the fibre drum family. To make it, long tubes, such as those ordinarily used for concrete molds, are cut into suitable lengths and then fitted with top and bottom as well as with inner sleeve. Here both outside and inside of the container are shown. Note the split ring and the construction of the lid. 6—The same drum as above, with the top in place. Photos, Beacon Container Co. 7—Fiberpak drum with a telescopic lid. Larger sizes are supported by a galvanized hoop. Used for the shipment of chemicals and other dry powdered materials. Photo, The Container Co.

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8—Octagonal Drumpak fibreboard drums are shipped knocked down. They come in various styles and sizes and are equipped with steel straps at top and bottom. Photo, Gaylord Container Corp. 9—This easily assembled hexagonal drum comprises a container within an outer shell made to form a nest for top and bottom. These are held in place by a tray and 6 finger-shaped cutouts. Photo, Paramount Container Co.

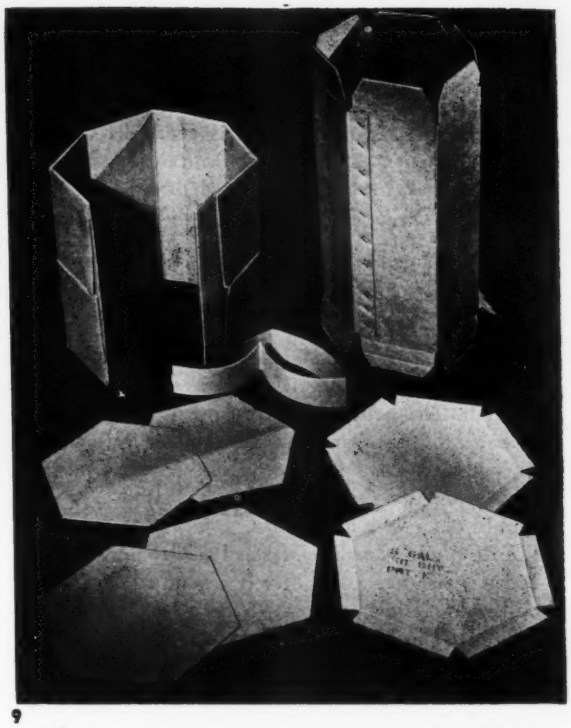
6. Drums should be stored on their bottoms in a dry place, under cover. They should be placed on dunnage if floors are wet. They may be tiered to any desired height with or without dunnage, provided the weights are not so great as to cause buckling of the sidewalls of the drums.

The Army Spec. 14A and Navy Spec. 39P16a issued Feb. 15, 1943, contain fibre drum specifications for overseas shipments which provide rigid requirements for fibre drums to meet. Among other particulars, an immersion test is prescribed. In the opinion of the writer, it is doubtful if any fibre drum manufacturer will guarantee that his drums will pass the immersion test which is fully described in these specifications.

Fibre drums now on the market

Ringseal Drum, Beacon Container Co.: It consists of a spiral-wound shell of 11 plies with an inner "A" flute-corrugated fibre sleeve. The ends of this sleeve are sealed with a ring washer which is held in place with glue. Each bottom and head is formed of an inner corrugated disc and two solid-fibre discs of different diameters glued and stapled together. These heads are held in place with hardwood split rings which are stitched to the shell with wire. The manufacturers claim that these containers comply with ICC Spec. 21B which is required for containers holding 5 gal. of inflammable paints.

Victoree Drum, California Stucco Products Co.: The maximum size is 5 gal. and has a spiral-wound sidewall of multiple plies. The two heads consist of several plies of fibreboard, glued together. The inner disc fits snugly inside the shell and the outer disc is flush with the outer periphery of the shell. Heads are attached with bias-woven cotton tape which is held in place with adhesive.



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Carpenter Drum, Carpenter Container Corp.: Made in a large variety of sizes from a maximum 75 gal. down to ¾-gal. minimum. It has a convolutely wound shell and wooden heads held in place with hinged metal rings which are locked with levers. This container complies with ICC Spec. 21A.

Economy Drum, Carpenter Container Corp.: Made in sizes from a maximum of 26 gal. to a minimum of 1 gal. It also has a convolutely wound shell. The fibre heads are shaped by drawing moist fibre discs under pressure. They are fastened to the shell by the use of gummed, bias-woven cambric tape.

Leverpak Drum, The Container Co.: Fabricated in sizes of 15 to 75 gallons. It has a convolutely wound shell. The bottom consists of a series of fibre trays, held in position with a galvanized steel band, applied with extreme pressure. The full-open head is steel, and it is held in position by an ingeniously designed and extremely efficient galvanized steel locking band. This drum complies with ICC 21A Specifications.

Fiberpak Drum, The Container Co.: Made in sizes from ¾ to 67 gallons. The shell is convolutely wound, one end flanged inward. The bottom is formed by attaching circular discs to the flange of the shell by stitching with wire. The larger sizes are supported with a galvanized hoop. A convolutely wound tube is inside this outer shell. The telescopic cover is formed in the same way as the bottom. The cover is sealed with two plies of 3-in. wide, 60-lb. kraft tape. This drum complies with ICC Spec. 21A.

Stapak Drums, The Container Co.: Fabricated in sizes ranging from 2 to 32 gallons. The shell is convolutely wound and the steel bottom is attached by crimping and reinforced with wire stitching. The steel slip cover of this drum is held firmly in place by means of metal seal-

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ing lugs which are attached to the sidewalls of the drum.

Keystone Drum, The Keystone Fibre Drum Co.: Made in sizes up to 55 gallons. It consists of a convolutely wound shell to which two steel heads are double seamed. or a full-open-head construction is available. One head contains a friction cover of any practical diameter which is held in place by channel clips or turnbuckles. When these drums are used for casting (pouring hot liquids which solidify on cooling) they can be equipped with one bulged steel head. The purpose of this head is to allow filling with sufficient liquid to compensate for the shrinkage on solidifications and fill the entire cubic contents.

The Standard Drum, The Master Package Corp.: Fabricated in sizes of 1 to 55 gal., it has a convolutely wound fibre shell. The bottom discs are held by a galvanized steel hoop that is secured to the shell. The top of the shell contains a galvanized steel protective band. The slip cover is of the same construction as the bottom. The cover is held in place with metal clips.

The All-fibre Drum, The Master Package Corp.: Sizes 1 to 55 gal., also has a convolutely wound shell. The bottom discs are held in place by a fibre bead which is attached to the inside periphery of the shell. The cover, which is of similar shape to the bottom, sets inside the shell on a narrow fibre bead. It is held in the drum with four metal clips which are attached to the outer sidewall.

Steel-fibre drums

Steel-fibre drums are made in 50- and 55-gal. sizes only, and are equipped with 6-, 9- and 14-in. friction-lid openings. The shell is convolutely wound and has steel heads. These heads, of 24- to 28-gauge steel, are crimped to the fibre shells, the ends of which are doubled over and glued. This increased thickness provides a more secure anchor for the heads. It also extends the chimes beyond the plane of the sidewall, thereby providing rolling hoops when moved on smooth surfaces. Openings are of the friction type with diameters up to 12 inches.

Hexagonal and octagonal fibre containers

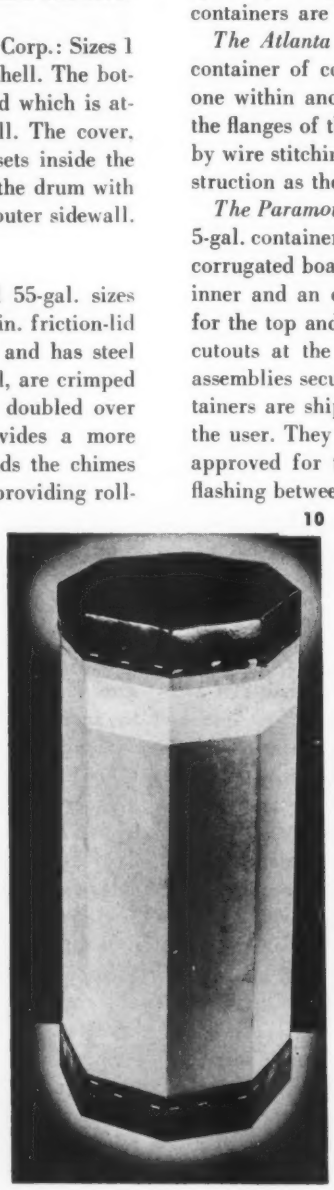
Closely related to fibre drums, are hexagonal and octagonal fibre containers of special constructions. They are used for transporting powdered and briquetted materials. Heavy viscous paints are packed in one type. Following is a brief description of the principal containers:

Drumpak Container, Gaylord Container Corp.: Octagonal in shape and fabricated from high-test corrugated board. The side seam of the shell is formed as in a fibre box, by wire stitching or with extra-heavy, 3-in. width cambric tape. Heads are interlocked with the cylinder, somewhat like the double seam of steel drums. These cover flaps are notched, forming a slight recess for the steel strapping which secures the heads to the shells. A specially designed dispensing head is available. These containers are shipped knocked down.

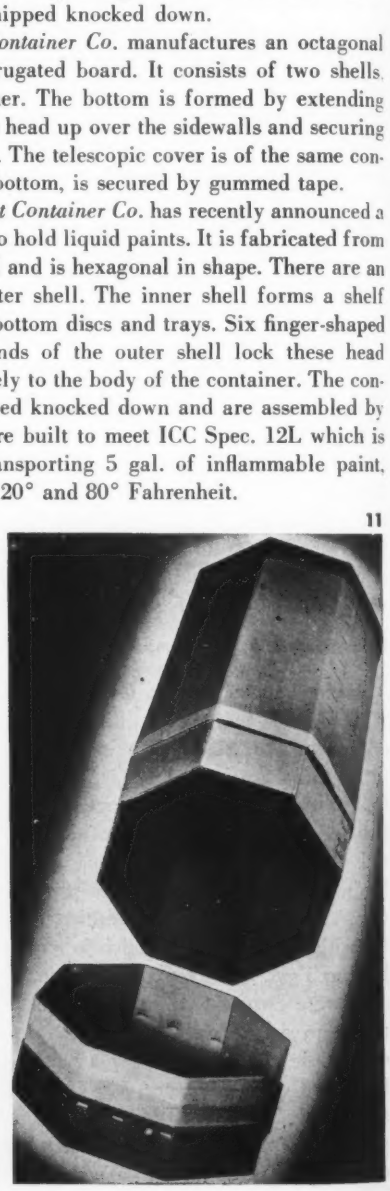
The Atlanta Container Co. manufactures an octagonal container of corrugated board. It consists of two shells, one within another. The bottom is formed by extending the flanges of the head up over the sidewalls and securing by wire stitching. The telescopic cover is of the same construction as the bottom, is secured by gummed tape.

The Paramount Container Co. has recently announced a 5-gal. container to hold liquid paints. It is fabricated from corrugated board and is hexagonal in shape. There are an inner and an outer shell. The inner shell forms a shelf for the top and bottom discs and trays. Six finger-shaped cutouts at the ends of the outer shell lock these head assemblies securely to the body of the container. The containers are shipped knocked down and are assembled by the user. They are built to meet ICC Spec. 12L which is approved for transporting 5 gal. of inflammable paint, flashing between 20° and 80° Fahrenheit.

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10 & 11—A self-contained octagonal corrugated container employed for shipping chemicals. Due to its patented construction, the top and bottom are stapled, thereby eliminating the possibility of sifting. A strong closure is achieved by bringing both of the outer sections to a butt and then applying tape around the circumference.

Linings for metal and fibre drums

by John Simonds

Severe requirements in the packaging of war materials have resulted in rapid progress in the development of new methods and new standards for coating many types of fibre and metal containers. These advances have also benefitted the packagers of materials intended for civilian distribution.

Because both fibre and metal are now widely used for applications which were formerly restricted to one or the other of these materials or even to others such as wood or glass, we will deal here collectively with both metal and fibre container linings. One exception should be mentioned in the case of fibre. When waterproof packages are required, chemical linings, adhesives, laminants and sealers combined with various types and structures of paper may be used to produce a tough, durable, water-resistant container.

The principal containers for which protective coatings and linings must be used are for the following main classifications of materials:

Bleaching powder compounds—These compounds are packaged in waterproof and moisture-vaporproof containers made of ordinary chipboard and kraft paper, using an asphalt or an asphaltic compound as a laminant together with a waterproof, chemically resistant laminant, or they are packaged in metal drums. For the metal drums, two different finishing systems are required. A two-coat system is used for the top container and inside of the cover, and a one-coat system is used for the bottom container and bottom of the top container. The United States Army Specifications concerning decontamination cans call for a lining lacquer in the top compartment to withstand one per cent chlorine solution for 96 hrs. at 70° F. The requirements for the bottom container lining specify that the lacquer be unaffected after refluxing for 2 hrs. in the organic liquid packaged in the bottom compartment.

The outside of this container is finished with warm drab enamel as shown on the United States Army Color Card 3-1.

The bleach drum is made of steel and is similar to a 15-gal. drum in size. Because of the fact that the bleaching powder packaged in the drum contains chlorine, a satisfactory lining lacquer is essential because chlorine attacks iron or steel, especially in the presence of moisture in which case hydrochloric acid is formed. To protect against this, the bleaching powder is kept as dry as possible and a specially designed high-grade lacquer is sprayed throughout the interior of the container and cover, then thoroughly baked on. The requirements of this lacquer are listed under United States Army Specifications relating to bleach drums. The outside of this container is finished with lustreless, blue-gray enamel to match United States Army Color Card 3-1.

Ammunition cases—Fibre shell cases consist of an elongated tube and use the same laminants as bleaching compound containers. Metal shell cases require a protective coating for inside and outside. Usually each container is dipped into a lustreless olive drab enamel which is especially designed under United States Army Specification ES680 Class 4. After dipping, the case is carefully drained and thoroughly baked under infra-red heat-

1—The 30-gal. fibre drum illustrated at the left replaced the steel container at the right for use with inflammable solids, oxidizing materials and Class B. poisons. Photo, The Container Co. 2—When it is employed for greases, the fibre-bodied drum at the left, which is equipped with metal ends and a coated interior, can replace the all-metal drum at the right. Photo, Texas Oil Co.

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Laminants and Adhesives Used in Fibre Drums
Water-Soluble
Silicates, Vegetable Glues, Animal Glues
Water-Insoluble
Waxes
Asphalts
Lacquers—solvent and emulsion types
Resins—solvent and emulsion types
Chemically-resistant
Resins

Linings Used in Fibre Drums
Chemicals (Solvent and Emulsion Types)
Vinyl Resins
Phenol Formaldehyde
Oleoresinous Varnishes
Lacquers
Silicates
Thermoplastics (Hot Melts)
Waxes
Paraffins
Resins
Fabricated Materials
Vegetable Parchments
Greaseproof Papers
Metal Foils
Cellophane
Rubber Hydrochloride
Cellulose Acetate
Ethyl Cellulose
Glassine

Sealers Used in Fibre Drums
Miscellaneous Cements, Rubber Compounds
Asphalt Cements, Resinous Cements
Pyroxylin Cements

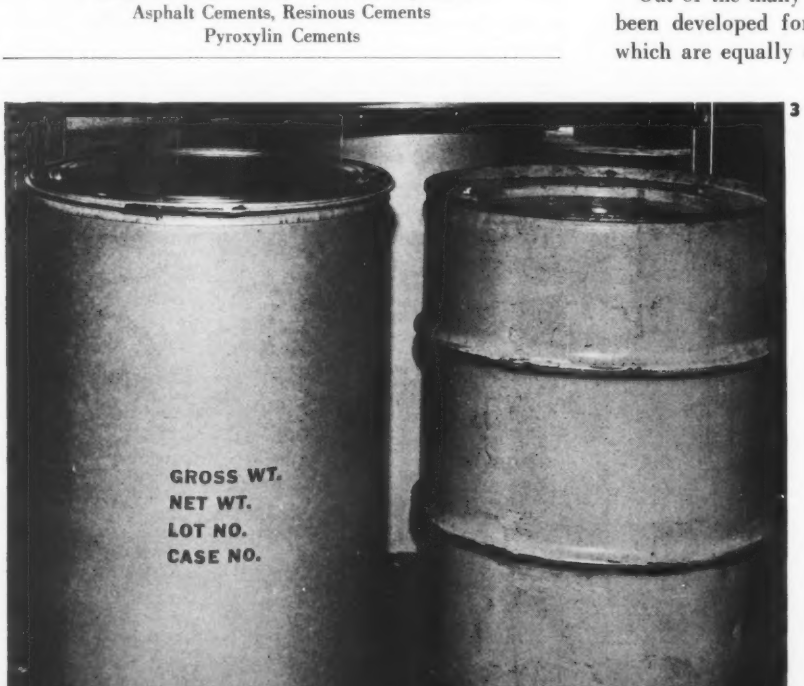
ing equipment. This process results in a tough, durable coating over the box, cover and fittings.

Water or gasoline cans—For the metal water cans, the organic lining lacquer used inside the container must be of the highest quality to prevent water contamination, as most ordinary lacquers give a foul flavor to the water. These containers are handled roughly, often being dropped from a truck or plane. As a result, the lining must resist cracking or flaking when the container is dented. Quite often Army personnel use these containers for making coffee or lemonade, so the lining must withstand these reactions and still protect the steel container against rusting and corrosion.

Foodstuffs—Great strides have been taken in the development of fibre containers that have been specifically designed for bulk shipments of perishable goods. These containers also must have particular laminants. Fillers, sealers and linings must be tasteless, odorless, waterproof and moisture-vaporproof. For shipments of dry materials, special laminants are used and combined with a particularly water-impervious vegetable parchment paper, or it may be necessary to use materials such as cellophane, glassine or a rubber hydrochloride sheeting. Viscous materials such as jams, icings, fondants and various types of viscous mixes are now being packaged in fibre drums. For this type of package, rubber hydrochloride was used for the inner laminant. While this material is now unattainable, very good results have been obtained by the use of a cellulose acetate and an asphalt or asphaltic compound for a laminant.

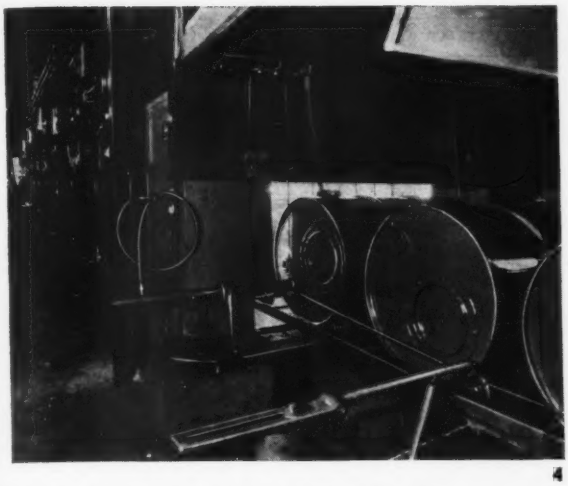
Types of linings for drums

Out of the many different types of linings which have been developed for civilian use, we have selected five which are equally effective on war materials and which



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3—*A fibre drum with an asphalt barrier-board interior construction is shown here together with the metal drum it replaced. Such drums may be fabricated with inner lining made of paraffin, cellulose acetate, glassine or vinyl resins. Capacity, 25—75 gallons. Photo, The Container Co.*



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4—Infrared ovens have been successfully used for baking drum coatings and linings. Baking times have been reduced, tougher and more uniform coatings obtained. Photo, Drayper Mfg. Co. 5—Container linings are subjected to rigid tests by producers. Photo, Ault & Wiborg Div., Interchemical Corp. 6—A 50-gal. metal drum with resinous inner lining for drugs, chemicals, munitions, foods. Photo, The Container Co.

illustrate a comprehensive group of problems and considerations. This information was prepared for metal drum coating but the basic approach will also be of value in fibre packaging considerations.

Type A—This lining is used for some of the more corrosive products formerly packaged in wood or glass. The coating consists of a phenolic base resin with suitable fillers for a primer and a specific type of phenolic resin for the top coat. This two-coat system represents the highest degree of protection in container linings against the greatest variety of products.

The two-coat system is relatively expensive, not only because of the fact that two coats are applied, but because the coverage in a pigmented prime coat is necessarily low. This system is recommended only where manufacturers have been unable to accomplish satisfactory protection with less expensive materials.

Type B—When this lining is properly applied and baked, it becomes hard and glass-like. This is a phenolic type lining insoluble in all known solvents. It is, therefore, especially useful as a lining for packaging such strong solvents as alcohol, chloroform, acetone, varnish remover, nitrocellulose lacquer, thinners, etc. This lining is recommended as a sanitary lining for steel beer barrels and is used extensively in this field.

Drums protected with this lining properly baked and aerated are absolutely free from oleoresinous paint and lacquer odor, and smell much sweeter than a plain steel drum. In containers intended for use requiring extraordinary protection and complete coverage, two-, three-, or even four-coat work may be performed.

Type C—This lining is being used extensively in containers for edible fats. It is of the same general composition as Type B, but sells at a somewhat lower price and is slightly less effective than Type B in the matter of resistance to the action of corrosive chemicals. Like Type B, it is a modified phenolic base, insoluble in all known solvents. As in the case of Type B, drums protected with this lining, appropriately baked and aerated, are free from oleoresinous paint and lacquer odor. More than one coat work is not recommended with this lining. Where greater protection is required, Type B is recommended.

Type D—This lining is suitable for drums intended to contain edible oils, lubricating oils, greases, industrial and transformer oils. It is a very high-grade lining of the synthetic oleoresinous type, and is the most widely used lining on the market for hydrogenated edible oil products, such as Crisco, Primex, Snow-Drift, Spry, etc.

Empty drums recently lined with Type D show a mild odor which is not transmitted as an extraneous odor or flavor to materials packaged. For this reason, and because of its greater flexibility, a number of manufacturers of edible hydrogenated products prefer this lining to Type B or Type C. *(Continued on next page)*

Type E—This lining is recommended for use in connection with hydrogenated edible oils. It is of the same general character as Type D, but is of an oleoresinous type of a somewhat lower quality, compounded primarily to meet requirements for a lower-priced product. It has been approved for hydrogenated oils and other edible products. Where competition is keen and the container is definitely employed as a one-time shipper, there is a market for a lining of this type.

All of the aforementioned linings should be sprayed over carefully cleaned steel and then force-dried by heat increasing from room temperature to 400° or 425° F., during a twenty-five minute cycle. When more than one coat is applied, only the final coat should be baked as above. Preliminary coats should be baked in the neighborhood of 250°—275° Fahrenheit.

Following are charts indicating the type of linings recommended for individual products. The numerals indicate the number of protective coatings of each type that is required.

LININGS FOR MISCELLANEOUS PRODUCTS

	Type A	*Type B*	*Type C*	*Type D*	*Type E*
Arcolene Soap (Dry Cleaning)	1	1			
Basic Casein Emulsion	1	2			
Formaldehyde (40% Aqueous)	1	2			
Green Oil Soap (40% Aqueous)	1	2			
Glycerin	1	1			
Lav-O-Let (Creosote)	1				
Magnesium Hydrate 30%	1	2			
Paint Products	1	2			
Putty Products	1	1			
No. 600 KOP Soap (Dry Cleaning)	1	2			
Sohio Soap	1	2			
Urea Formaldehyde Resins	1	1	1		
Varnish Products	1	2	1	1	
Witch Hazel	1	2			
Wood Pulp Lactic Acid	1	2			
Yellow Pulp Color	1				
Zinc Chloride (70%)	1	1			

LININGS FOR STRONG SOLVENTS—COAL TAR & MISCELLANEOUS

	Type A	*Type B*	*Type C*	*Type D*	*Type E*
Acetone	1	1	1		
Amyl Acetate	1	1	1		
Amyl Alcohol	1	1	1		
Ansol	1	1	1	1	
Benzol	1	1	1		
Butyl Acetate	1	1	1		
Butyl Alcohol	1	1	1	1	
Butyl Lactate	1	1			
Denatured Alcohol	1	1	1	1	
Dibutyl Phthalate	1	1	1		
Ether (Sulphuric)	1	1			
Ethyl Acetate	1	1			
Ethyl Alcohol	1	1	1	1	
Lacquer Thinners	1	1			
Lacquer (Nitro)	1	2			
Propylene Dichloride	1	1	1		
Toluol	1	1	1	1	
Tricresyl Phosphate	1	1	1	1	
Turpentine	1	2			
Xylos	1	1	1	1	

LININGS FOR ANIMAL AND VEGETABLE OILS & FATTY ACIDS

	Type A	*Type B*	*Type C*	*Type D*	*Type E*
ACL (Stearic Acid Chloride)	1	1	1		
ADM No. 100 Oil	1	1	1		
AM Coco (Fatty Acid Derivative)	1	1			
AM Coco B (Fatty Acid Derivative)	1	1			
AM 1181 (Fatty Acid Derivative)	1	1	1		
Castor Oil	1	1	1	1	1
Castor Oil Fatty Acids	1	2			
China Wood Oil	1	1	1	1	1
Essential Oils	1	1			
Fatty Acids of Drying Oils	1	2			
Fish Oil	1	1	1	1	1
Fish Oil Fatty Acids	1	2			
K-1170 (Fatty Acid Derivative)	1	1	1	1	
Linseed Oil	1	1	1	1	1
Linseed Oil Fatty Acids	1	2			
N Coco (Fatty Acid Derivative)	1	1	1		
Oleic Acid	1	2			
Perilla Oil	1	1	1	1	1
Pine Oil	1	1	1	1	1

LININGS FOR PRODUCTS OF OIL REFINERS

	Type A	*Type B*	*Type C*	*Type D*	*Type E*
Base Oil "A"	1	1	1	1	1
Gasoline	1	1	1		
Grease (Lubricating)	1	1	1	1	1
Hydrogenated Naphtha	1	1	1	1	
Hydrocarbon Solvents	1	1	1	1	
Industrial Oils	1	1	1	1	1
Kerosene	1	1	1		
Lubricating Compounds	1	1	1	1	1
Lubricating Oils	1	1	1	1	1
Mineral Spirits	1	1	1	1	
Nujol	1	1	1	1	
Petroleum Ether	1	1	1		
Petroleum Jelly	1	1	1	1	
Petroleum Solvents	1	1	1	1	
Transformer Oils	1	1	1	1	

LININGS FOR FOOD PRODUCTS

	Type A	*Type B*	*Type C*	*Type D*	*Type E*
Amaizo (Edible Lactic Acid)	1				
Beer	1	2			
Butter	1	1	1	1	1
Cane Syrup	1	1	1	1	1
Caramel Coloring	1	1	1	1	1
Chocolate Drink Syrup	1	1			
Cola Concentrates	1	2			
Condensed Milk	1	2			
Diamalt	1	2			
Evaporated Milk	1	2			
Hydrogenated Edible Oils	1	1	1	1	1
Karo Syrup	1	1	1	1	1
Lard	1	1	1	1	1
Margarines	1	1	1	1	1
Soft Drink Concentrates	1	1			
Sorghum Molasses	1	1			
Sugar Syrup	1	1	1	1	1
Vitamin Solution "B"	1	2			

Wood barrels and drums

Traditional shipping containers which continue to be standard for many jobs, wood barrels gave remarkable emergency service during the early days of the war. They could be relied upon to deliver war and Lend-Lease goods when the steel shortage was so critical that there simply wasn't enough of it to make the required number of metal drums. Though the steel situation is easier at present, the wooden barrel is still very much in service despite the fact that a 50-gal. wooden barrel weighs 72 lb. as against 51 lb. for a 55-gal., 18-gauge steel barrel, and despite the fact that the wooden containers are slightly more costly and require more shipping space.

The wooden barrel goes back to the ancient Roman times when, of course, it was strictly hand made. Today its machine-made successor differs little from its ancestor. There is a shortage of skilled labor in the cooperage trade, as well as a lack of cured wood for staves. Estimates in the cooperage industry indicate a possible production of 6,000,000 barrels a year.

Though the structure of the modern barrel remains the same, improvements have taken place in the use of linings and coatings. One consists of a weatherproof coating with an asphalt base, which, it is claimed, will withstand heat, cold, dryness and moisture without causing swelling or shrinking of the wood, slacking of the hoops, warping of heads or opening of joints. It is recommended for export shipments. Also, it is possible to vary the inside coatings of wooden barrels to accommodate differences in the chemical composition or protective requirements of the product they carry.

Another modern touch provides metal flanges and plugs in the heads of the barrels. These make it possible to siphon out the contents by the method which is used with steel drums and they thus adapt the wooden barrel more readily for re-use.

How to handle wood barrels

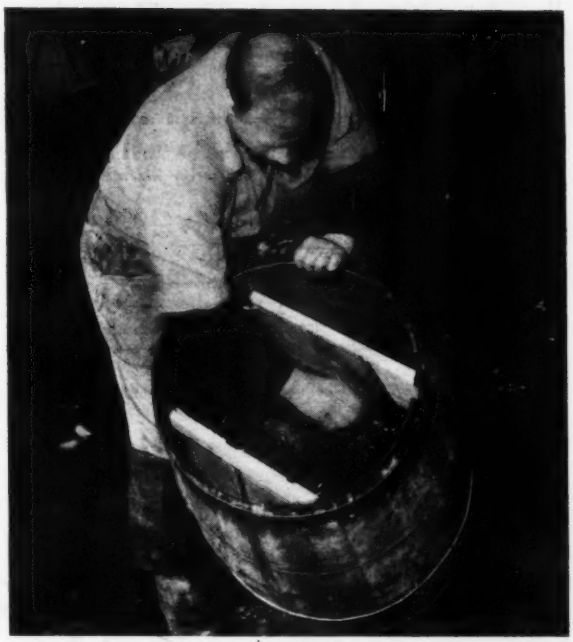
The revival of cooperage means that American shippers must learn all over again how to use barrels. Pointers for the handling of barrels include the following:

1. Roll the barrel on its "bilge" or side, never roll it "hand-over-hand" on end
2. "Ease" barrels gently down the skids
3. Avoid rough handling—wood can't take it
4. Don't expose barrels too long to the sun—they'll dry and shrink
5. Barrels should not be stacked tier on tier
6. Use hooks carefully
7. In loading for export shipment, use chime hooks or rope slings, not loading nets

In view of shortages of material and manpower which necessitate longer life for containers of all types, the proper handling of the wood barrel is essential.



1



2

1—Tight cooperage is employed for barrels which carry liquids. In handling, barrels should be rolled on the "bilge." Photo, Socony-Vacuum Oil Co., Inc. 2—Slack cooperage such as this is used to transport non-liquids. Here the refrigerated barrel holds live lobsters.

Wood boxes

Sawed wooden boxes, plywood boxes and wirebound boxes comprise the general types of wooden boxes and crates which are employed as shipping containers. Although available in hundreds of sizes and weights to accommodate products ranging in size from pencil leads to bombing planes, wooden boxes made from sawed lumber are all classified under seven distinct headings known as Styles 1, 2, 2½, 3, 4, 5 and 6. Styles 7 and 8 are variations of Style 6. The box styles are illustrated below, and a brief description of each follows.

The Style 1 box, simplest of all, is adaptable to many types of products, with 60 lb. as a reasonable weight limit. Boxes of this type consist of a single thickness of lumber made from one or more pieces of wood, with sides, top and bottom nailed to the ends. Top and bottom boards are nailed to the side grain of the ends and the side boards in this type are nailed to the end grain of the ends.

In Styles 2, 2½ and 3, each end is strengthened with four cleats. The ends are thus reinforced against splitting and the sides are strengthened by the greater holding power of nails driven into the side grain of the vertical cleats. For gross weights of more than 200 lb. and for large containers such as are used for textiles, these styles are commonly used.

The Style 4 box is designed to carry loads up to 200 lb. and to withstand severe handling. The two heavy cleats at each end of the box will strengthen the ends against splitting, provide side-grain nailing for the sides and they will help to take the thrust in case the box is dropped.

When the question of storage space makes desirable a reduction in the outside length of the package, and when the shape of the contents is such as to leave space in the corners of the box, cleats are placed on the inside to form the No. 5 box. Cleats may be square or triangular.

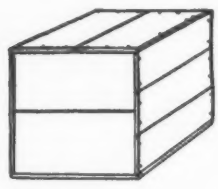
Style 6 boxes, with lock-corners, are often used when tight, rigid packages are required. Weights carried are usually 10—150 pounds. Lock-corner boxes are of particular value for products that are subject to sifting or where maximum rigidity is required.

In selecting any one of the eight styles of boxes, a shipper may be influenced to some extent by the comparative initial cost, without giving due consideration to other important factors. In general, Style 3 boxes cost the most and Style 1 boxes the least. Although the difference in cost is not great, there is a big difference in the performance of the several styles of boxes.

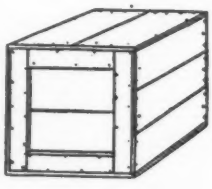
The distance the box must travel and the transportation facilities to be used, will appreciably affect the design, as will the use of reinforcing metal straps or wire. Although there is an impression among shippers that lighter containers may be used for carload shipments, it should be remembered that, except in rare instances, every container may move in less-than-carload traffic.

Boxes rigidly constructed from sawed lumber, in itself

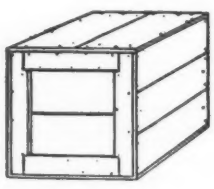
Wood box styles. Style 1: nailed wood box with uncleated ends, sides held by end-grain nailing. Style 2: nailed wood box with double-cleated ends eliminating weakness of Styles 1, 4, 5. Styles 2½ & 3: variations of Style 2. Style 4: nailed wood box with outside cleats. Style 5: nailed wood box with inside cleats. Style 6: lock corner box with cover and bottom which are held in place by nailing. Styles 7 & 8: variations of Style 6.



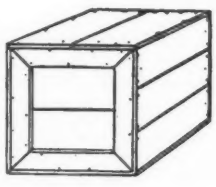
Style 1



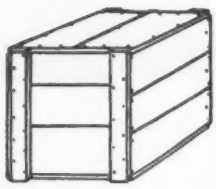
Style 2



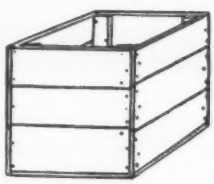
Style 2½



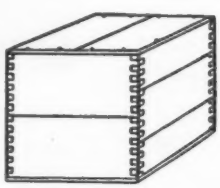
Style 3



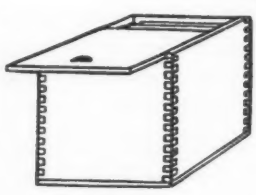
Style 4



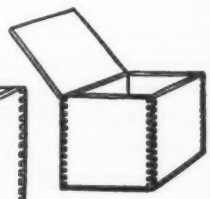
Style 5



Style 6



Style 7



Style 8



1



2

1—*Bomb fins pack easily in wirebound wood boxes. Photo, Wirebound Box Mfrs.' Assn.* 2—*Wood box forms exterior of refrigerated shipping container for jars of "live" blood. Photo, Owens Corning Fiberglas Co.*

tough and hard, offer a high degree of protection against cutting, puncturing and abrasion. Wooden boxes may be stacked without special braces and cars or trucks may be completely filled. Warehouse charges, usually figured on the basis of floor space occupied, can frequently be cut by high piling, without damage to containers.

Wooden boxes provide a difficult barrier for sneak thieves and offer protection against rodent attack. Not being affected readily by moisture or humidity changes, wooden boxes, when properly packed, often protect their contents from hazards of rain or snow for considerable periods of time.

Plywood boxes

The thickness of material alone does not determine strength. Plywood is an improvement upon nature—made by the gluing together and crossing of the grains of two or more pieces of thin wood, called veneer. Plywood, weight for weight, is stronger than other materials and this light, strong material is reinforced with sawed lumber cleats in a number of ways to produce the standard styles illustrated. For many uses, special styles are needed and these are scientifically designed to meet conditions. Each commodity presents a separate problem, so that various thicknesses of plywood and sizes of cleats are used. Often, unless shipping experience is available, laboratory or other tests to determine correct construction are necessary.

Plywood box parts are all one-piece, this being one of the factors accounting for the great strength, the light weight and the protection against dirt and pilferage, making assembly of the shooks very simple and economical and ensuring that all shooks received can be assembled without loss.

For many commodities, internal bracing is necessary and the one-piece construction of plywood boxes is such as to add strength to this bracing and often makes possible a simplification which is not attainable where similar rigidity is not supplied.

Thickness of plywood used for shipping containers varies from $\frac{3}{24}$ in. to $\frac{5}{16}$ in. in 3-ply and, for heavy or export work, 5-ply as thick as $\frac{1}{2}$ in. is at times used. The cleats most generally used are $1\frac{1}{2}$ in., 2 in. and $2\frac{1}{2}$ in. in width and $\frac{5}{8}$ in. or $\frac{13}{16}$ in. in thickness.

Sizes range from those made to carry very small articles to those 200 in. or more in length, many of which carry extraordinary weights. (Also see *Veneered Packages*, p. 786.)

Crates

Crates are frequently employed for the transportation of a wide number of articles. For many uses, special styles are needed and these are scientifically designed to meet conditions.

In all instances, however, the crate must be big enough to enclose entirely the article or articles, and no parts must protrude. Also a space of at least one inch must be provided between all finished surfaces and the inside of the crate. The merchandise packed within must be blocked, braced or fastened so that it cannot move around inside the crate.

Selection of lumber, nails and type of construction will depend largely upon the merchandise to be crated, whether or not the product is to be stored for any length of time, whether it is to move to a hot, humid destination from a cold, dry temperature or vice versa and whether it is going to move by water as well as by rail.

The Freight Container Bureau, 30 Vesey St., New York, has issued Bulletin 6 giving full information on the essentials of crating.

XUM

Veneered packages

by Robert W. Davis

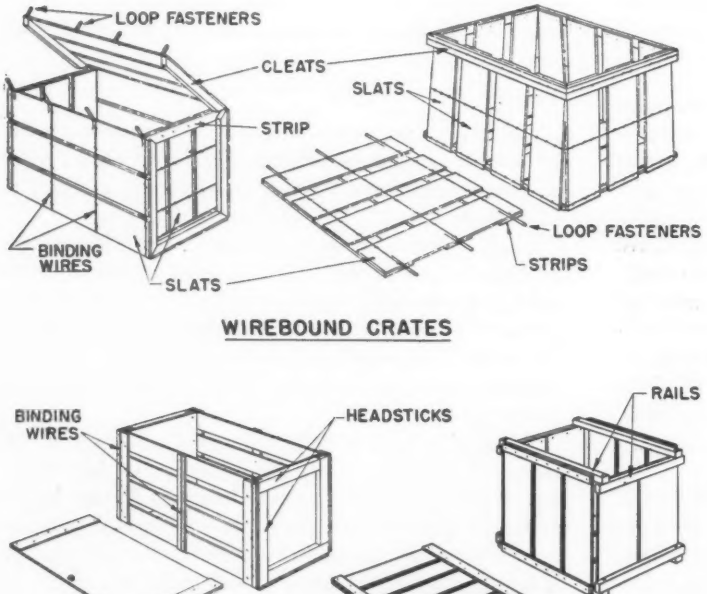
Many people think of veneer as a liquid which you apply to the surface of an article, rather than as a material from which a large quantity of shipping containers are made. There is hardly a person in this country, however, who does not come into contact with this class of container every day. Indeed, they are called upon to carry the load in moving a large amount of our commodities to market. Little romance has been woven around their manufacture. Veneer shipping containers are, in fact, a most important part of the wooden package industry.

They are made principally from rotary cut lumber, or knife cut lumber, as it is sometimes called, although they may also be made either from sliced or from sawed material. Veneer, as defined by the U. S. Forest Service, is any thin piece of wood which may be sawed, sliced, or rotary cut. Just where the dividing line between veneer and resawn lumber lies has never been accurately defined, but anything less than 3/8-in. thick is generally classed as veneer while anything thicker than that would be considered sawed lumber. This difference is further substantiated in the commercial wooden box regulation issued by the Office of Price Administration, where anything over 3/8-in. thick and 4 ft. long is classed as lumber. Therefore, many wooden shipping containers may contain a combination of veneer and lumber, if material thicker than 3/8 in. or longer than 4 ft. is incorporated in their construction. We will confine our use of the word "veneer" to that material which is under those specifications.

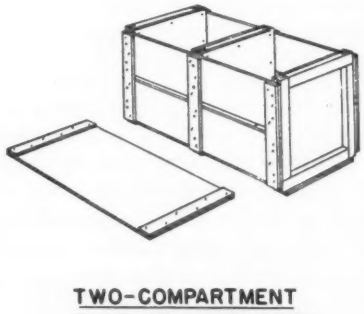
Generally speaking, we in the container business think of veneer shipping containers as those produced principally from rotary cut lumber since nearly all of them fall into that category, though a small fraction of a per cent are produced from sliced materials. This group does not include the large number of containers produced from resawed lumber under 3/8-in. thick.

Rotary cut lumber may be used either in single thickness or in multiple thicknesses laminated with glues or adhesives, or laminated by stapling the parts together with the grain of the wood running in opposite directions to increase the rigidity of the product. Laminating by stapling is the most common method, although the use of adhesive-laminated plywood containers is growing very rapidly.

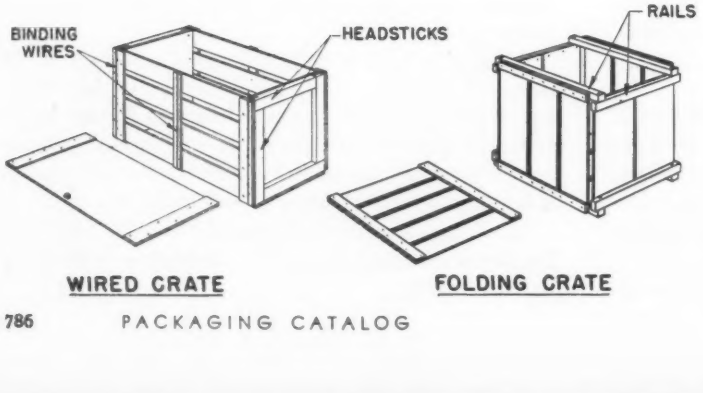
Single thickness packages may be produced in connection with wood head sticks on which are stapled or nailed veneer panels. The sides, tops and bottoms of the container may be of single thickness veneer, as in the case of the wood egg case or pineapple crate, or a unitized veneer may be used in which narrow cleats or strips unite the sides, top or bottom into one piece, making it more convenient for the packer or shipper to assemble the finished package. For egg cases, the cover must extend over the entire top, and be a clear piece of veneer, generally cottonwood, while the other parts of the container may be made of more than one piece of material—the latter, of course, represents an economy in manufacture. In egg cases, it is



WIREBOUND CRATES

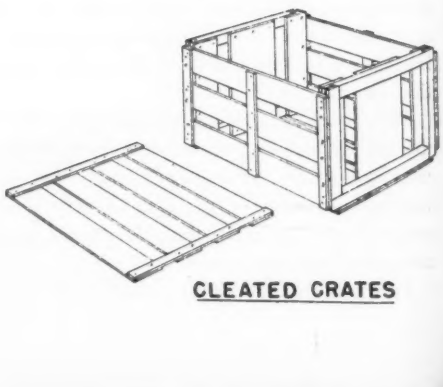


TWO-COMPARTMENT TYPE OF CONTAINERS



WIRED CRATE

FOLDING CRATE



CLEATED CRATES

desirable to have an odorless and tasteless wood, which is why cottonwood is so often used. Many fruit and vegetable containers, which are subject to a great deal of moisture and rough handling, are included among the unitized veneer packages, examples of which are such popularly known shipping containers as pepper crates, vegetable crates, tangerine boxes, bushel crates, and the like.

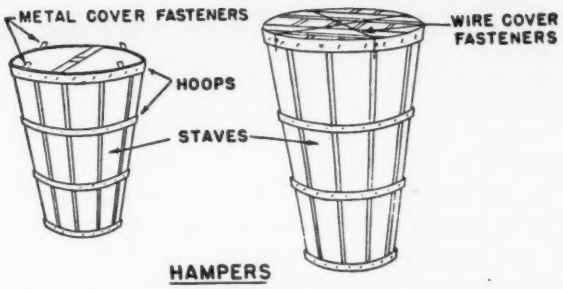
A modification of the veneer crate is the wirebound container. Fundamentally this type is composed of cleats and veneer parts, either rotary cut or resawed, but a number of encircling wires are stapled to the container, the number depending upon the amount of weight to be carried. In essence, steel is substituted for wood in this case, and there is less lumber and more steel in a wirebound container than in a cleated box. These containers are manufactured on specially designed machinery and are engineered to do specific jobs. In addition, certain of the wirebound containers have interlocking loops on the binding wires so the packages may be set up by hand and even be re-used for certain purposes.

Another important type of veneer package is made of rotary cut material encircled by special veneer hoops or bands. The finished package can be nested on these bands. Among the advantages of this type of construction is the fact that the package can be completely manufactured and the packer or shipper does not have to set up the container before it is ready for final use by the consumer. Bushel baskets, which are in this classification are manufactured in a variety of sizes and shapes. For the shipping of fresh fruits and vegetables, the sizes of such packages are governed by the U. S. Standard Container Acts of 1916 and 1928. However, these container laws only apply to the shipment of fresh fruits and vegetables, and other sizes can be manufactured and sold for other commodities. In the large container class, the most popular size is the one bushel basket of continuous stave or short stave construction with a solid, a built-up or a fabricated bottom. This construction is similar to that used for slack barrels, but the package is much smaller and usually does not have the liner type of construction.

In many of our small towns and rural districts, the bushel basket is the family size container and the filled package is often purchased in its entirety. In the larger cities and metropolitan districts, this is not so often the case. Besides the bushel size, there are the half-bushel and smaller sizes for various purposes.

A specialized basket which is not round in shape is known as the market basket and may be made in the diamond or square braid type of construction. As a shipping container, the square braid is generally the most practical construction, although some baskets are of the slab type. The only disadvantage of market baskets is that they cannot be shipped for long distances unless the handles are detached, for they do not nest completely as do bushel baskets. Of course, the handles can be shipped detached, but in this case they must be put on by the shipper after he receives the packages, an operation which is no more trouble than assembling a box or crate from its shook form.

Another broad classification of the veneer package is



HAMPERS

known in the industry as "small goods" and comprises berry boxes (both the pint and quart sizes), as well as the tills (oblong boxes larger than quart size) and the climax baskets which are oval veneer containers with a board bottom. In this country, the climax basket is usually made in 2, 4, and 12 quart sizes, while in Canada there are many other sizes of climax baskets. The oblong pint basket, for example, is an exceedingly popular container for shipping strawberries from Florida during the winter months, and its use has expanded for many other commodities because it is an ideal consumer package, very attractive in appearance. The square pint has been used in recent years with a cellophane top for the shipping of fancy or cultivated blueberries, and both this and the oblong pint have become accepted consumer packages for quality merchandise.

Another important type of container is the plywood package made from adhesive-laminated veneers of which the grains run in opposite directions to give the maximum strength. Weight for weight, plywood is stronger than steel, so that in this type of construction one gets a very strong package of comparatively light weight—a factor of utmost importance for any shipping container. Plywood containers include both square boxes and round drums. Plywood boxes with outside cleats provide economically for a completely covered surface, and are very desirable for shipping certain classes of goods. Use of plywood drums has increased rapidly in recent years because they afford great strength and are especially satisfactory for shipping heavy commodities where the package can be rolled rather than lifted. Such commodities as soaps and other heavy merchandise, may be packed in plywood.

For each commodity and purpose, a specially engineered veneer container has been developed to meet the shippers' needs. Veneer containers of one sort or another are available in practically every section of the country in large quantities. Often a container used for a given product might very well be adapted for the shipping of some other commodity. During wartimes, a great deal of this substitution is necessary and shippers who have difficulties in locating a certain type of package can often secure another which may do the job as well, or better.

Manufacturers of veneer packages can be of real assistance to the shipper in working out a design for a given commodity, and some of the larger concerns, as well as the trade associations in their respective fields, are able to be of considerable technical assistance. (Also see *Wood Boxes*, p. 784.)

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Carboys for shipping

by W. A. Kerr

A carboy is a large glass bottle suspended in a wooden box. The protective packing mediums are cork in one form or another and rubber blocks. Sometimes salt hay packing or excelsior is used for either a single trip carboy or as a re-use carboy in the smaller sizes. The three component parts—bottle, box and packing—are together known as the carboy. Carboys have been used to transport acid since the very inception of corrosive liquids. They have proved in more recent years to be most satisfactory also for shipments of inflammable liquids.

At one time carboys were available in capacities ranging from 10 to 15 gal., the most popular in the last decade being the 12- and 13-gal. sizes.

The manufacture of large carboy bottles involves no simple production problem. The bottles are so large, the quantities in demand so small, that it would not be economically sound to produce them by automatic machinery. The glass is gathered and partially formed by hand, then finally blown in a cast iron mold. The blowers must be highly skilled, and comparatively few are obtainable who have had such training. When the bottle is removed from the mold, slow cooling in ovens or lehrs is necessary to prevent stresses and strains.

All bottles are thoroughly inspected and tested before they leave the manufacturer's plant. The carboys are first tested by vision tests and then by striking with a small steel rod to reveal to the tester, by the sound of the reporting ring, the distribution of the glass.

Numerous carboy users have, over a period of years, utilized their own special type or capacity carboys. Some lent themselves well to production, some poorly. In an effort to standardize the use of carboys and increase production with the same amount of available skilled labor, and also to create a stronger bottle, the Manufacturing Chemists' Association, through its carboy committee, conducted an investigation on carboy bottles. These tests were carried on through the cooperation of the Massachusetts Institute of Technology and the Gayner Glass Works, Inc.

The result of these tests was the development of the present 13-gal. M.C.A. standard carboy, with few exceptions, the universal carboy bottle today. A few 12-gal. carboys of the same general shape as the 13-gal. M.C.A. standard are still being manufactured, but for replacement in existing boxes only. This standardization has proved especially good in the face of the demands World War II has placed upon the chemical industry.

It would be difficult to estimate the average life of carboys because of the many types of boxes and packing material, the widely differing services they are called upon to render, and the treatment they receive from shippers and handlers. It is, however, estimated by the industry that the average life of a carboy bottle is approximately ten years. The average life of a carboy box is four years, and of the packing—depending upon the type—from one to ten years.

The value of the bottle represents about 55—60 per cent of the cost, the box about 25 per cent and the packing 15—20 per cent. It is, therefore, most logical that care be exercised in the production and handling of the bottle, and any extra protection which can be given to extend its life is economically sound.

Every complete carboy package, before being used for corrosive or inflammable liquids, must have imprinted on the side of the box the letters "I.C.C" (Interstate Commerce Commission) followed by the specification number applying to the particular purpose to which the carboy is assigned. Underneath these two groups of letters the symbol (assigned by I.C.C.) of the assembler must appear.

In an effort to avert breakage of carboys in transit and establish a standard to which all carboys must comply, the Bureau of Explosives set up a standard swing test which simulates the shock a carload of carboys going at a speed of six miles per hour would receive should it bump into a stationary object. Semi-annual tests are required, and random selection from stocks are subjected to these tests wherein the carboy is filled with water and set in a cradle attached to a 14-ft. pendulum at the base of which is a large concrete block. In order to comply with present regulations for shipments of dangerous liquids, 90 per cent of all carboys tested must withstand swing tests up to 55 in. when striking the concrete abutment on both side and bottom. Of course, all approved packages will stand this test.

This carboy packing with a patent corner construction is equipped with rubber cushioning to absorb shocks. Photo, American Cyanamid Co.



Prepacking for convenience

by Paul Meelfeld

While the term "prepacking" is winning increased attention today, the idea it describes is not entirely new. This convenient method of eliminating unnecessary packing operations has been employed in certain lines over a period of years.

Development of prepacking

Some years ago, manufacturers began to pack such things as toothbrushes, belts and tennis balls in unit of sale packages. This action was certainly a step in the prepacking progression, and achieved many of the advantages now accruing to manufacturers and retailers alike in cases where merchandise is prepacked.

The prepacking trend is also evident in the packaging of silverware, infants' layettes, handkerchief sets, toilet sets, and pen and pencil sets. Not too long ago manufacturers began packaging these items in units to be sold by the retailer from a store sample, and delivered to customers from retailers' warehouse stocks, thereby eliminating the needs for further repacking.

Advantages

Today, the many advantages of prepacking are becoming more widely recognized, and its proponents are pushing the idea for greater postwar acceptance. Retailers believe that prepacking will, in large measure, be the means of increasing current volume after the war. Whenever it is feasible to prepack products, it is possible to achieve the following noteworthy objectives, which prove of important benefit to the manufacturer, the retailer, and the ultimate consumer.

1. When prepackaging is employed, custom-built packages may be designed to meet the requirements of the particular merchandise involved. In this way loss claims are likely to be reduced.
2. Prepacking eliminates the need for store inspection before delivery.
3. It saves triple handling from receipt of goods by the retailer to final delivery: namely, unpacking in the retailer's receiving room, handling in storage and repacking.
4. The prepacking of merchandise can also effect a cut packing room personnel by eliminating the repacking operations. When sales are made from a store sample, only the delivery label need be attached to a prepacked article in storage.
5. An increase in the unit of sale often results from

1—A merchandising advantage of prepacking is the fact that prepacked products form the basis for effective window displays. With other methods, attractive packages unsuitable for final delivery are seen only by the retailer's personnel. All photos in this article, Hinde & Dauch Paper Co.

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2—Prepacked cookies are protected by a corrugated box suitable for display and mailing. 3—Three units are sold easily as one in this package. 4—Prepacking a sewing machine expedites handling. 5—Tool kit in prepacked box increases sales by promoting take-with purchases.



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prepacking merchandise. Many items heretofore sold individually can be grouped together and thus sold as prepacked units, reducing operating costs and thereby increasing the profit margins of the department.

6. Attractive eye catching packages permit effective mass displays of various types of merchandise, which increase sales and product turnover in prepacked products.
7. In many instances, the package offers a dual-use. For example, a luggage box, a home storage container, a play item. Such packages stimulate sales, lend themselves to effective economical displays and promote take-with purchases.
8. Anticipation of arrival is heightened by effective prepacking, in which merchandise reaches the consumer factory fresh and helps to build good will for both manufacturer and retailer.
9. Smart packages add prestige to products and help to establish the name of the manufacturer and his line in the customer's mind. Under former packaging methods, many attractive packages, unsuitable for final delivery, are seen only by the retailer's personnel.

Costs

Each advantage listed above has a direct bearing on increased sales and lowered distribution costs. It should be mentioned here that only one important objection has been raised to the idea. This also concerns the matter of cost. It is true that prepacking actually does cost more than bulk packing. However, its proponents point to its many *economical* advantages and reason that the *ultimate net profit* on an item is, if anything, greater when merchandise is prepacked than when it is bought and packed by the retailer's packing department.

While the cost of prepacking is as yet a thorny problem, its advantages in retail selling and distribution far outshadow its cost disadvantage. That is why the cost problem is fast being solved to the satisfaction of both manufacturer and retailer.

Packaging of metal parts

by W. T. Black

The experience which we have gained in the present conflict in connection with the packaging of metal parts and assemblies will be used in setting up package development department as well as shipping room operations after the war. This is especially true in view of the fact that we have made such large strides in unitizing packs for war use and it will be remembered that the public before the war was becoming more unit-package-minded. not only in foods, drugs, cosmetics, and the like, but also in the metal parts and assemblies fields.

Basically, there are three methods which have been widely used for both domestic and export shipments of war material. All three methods have their places in the metal parts and assemblies packaging field, and will be described in detail in later paragraphs. Before the war, however, the only method which was recognized was that which was later modified and known as Method I. This method incorporated the use of dipping compounds and greaseproof papers. Soon after the outbreak of war, however, Army Ordnance gained experience on proper methods of packaging metal parts and assemblies and approved the use of Method I-A which is now widely used by most of the branches as an improved means of preventing corrosion. Long before Pearl Harbor, however, the Army and Navy Air Corps experimented with a new method of preventing corrosion which was found to be highly satisfactory. This is known as Method II and was first accepted and used by the Army and Navy Air Corps in packaging aircraft engines. Method II soon gained wide acceptance and the rest of the branches followed by writing it into their specifications also.

Method I

This method which incorporated practices used during World War I (dip and wrap) was the only method which the services had to turn to when we started exporting and domestically storing war materials. They were soon to learn, however, that this method, even on non-critical metal surfaces, was not satisfactory and the need for many improvements was seen. Such improvements have now been made and through the use of newly developed pH controlled greaseproof materials, rust-inhibiting dipping compounds, and improved corrosion prevention practices in the packaging operation, Method I has taken its place as a safe means of packaging many kinds of metal parts and other items—machined, forged, or cast. The experience on the use of Method I certainly has been valuable to peacetime applications for items such as the parts in the automotive industry, simple parts in the electrical field, and the like. Method I has proven itself to be an excellent means of protecting certain parts for long-time domestic storage. In many instances, manufacturers who have averaged 10 per cent loss on long-time spares storage will be able to eliminate this loss completely by Method I processing at the time the product is being manufactured.

According to a packaging and packing manual issued by Army Ordnance, the function of the greaseproof, non-corrosive wrapper is to prevent the flow of the preservative on the surfaces of the packing material, to prevent contact of parts surfaces with dunnage or blocking, and also to provide some protection against mechanical damage from impact, abrasion, and the like. Corrosion resistance in a Method I package is provided entirely by the applied preservative. The preservative must be adequate to resist the corrosive atmosphere, moisture-vapor, and possibly liquid water. To function properly, the preservative must not flow off during hot weather, must not be absorbed by blocking and dunnage, and must not easily be scraped or squeezed away. Contact with blocking and dunnage is undesirable because these materials contain various amounts of corrosive agents. From a corrosion standpoint, the wrapper itself will contribute little or no protection; the lack of sealing permits entry of corrosive agents even if the material itself is relatively impervious to these agents. On the other hand, lack of sealing permits easy exit and elimination of any condensed vapor or water acidity.

Method I-A

The first new method developed for war use and one which will have wide application after the war is that which is known as Method I-A. Industry has come to recognize the importance of this method, and it is reasonably certain to assume that metal parts such as bearings, filters, gears, oil pan assemblies, clutch pressure plates as well as any item in the machine tool, and electrical field, will continue to be packed by this method after the war. One lesson has certainly been learned from war packaging experience and that is the importance of the proper use of the methods after they were once developed. Many faulty practices have been noticed and eliminated. For example, corrosion has resulted from the simple mistake (in the packaging room) of permitting bare hands to contact metal parts having critical surfaces. Correction of such practices will surely be remembered in time of peace. In order to give the required positive protection to parts in the Method I-A category, the service branches recognized the following approved practices of applying this method: (1) The part or assembly must be properly cleaned and preserved. The preservative must offer adequate protection against moisture condensation from the entrapped air volume and against the moisture which might be transmitted through the barrier. (2) The part or assembly must be enclosed in a waterproof packaging medium. Either the package alone, or the wrapper plus subsequent operations shall render the package waterproof but not necessarily moistureproof. For the most

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part these qualifications are filled by specifically designed materials and/or dipping compounds.

In order to maintain the high standard of packaging by Method I-A after the war, it is suggested that specifications enforced at the termination of the war be continued since they represent seemingly practicable methods which are as close as possible to perfection. Most of the service branches concerned with packaging metal parts or assemblies have written specifications stating to what degree the Method I-A pack must protect the part. Army Ordnance, for example, specifies that all I-A packs must be capable of passing a cyclic exposure test as outlined in detail in one of their manuals, which specifies that the function of the Method I-A is to provide long-term protection against corrosion caused by moisture or corrosive atmosphere. The entry of fresh or salt water from rain, wave slushing, or possible immersion is resisted by a waterproof, sealed barrier.

Waterproof characteristics of a wrapping show resistance to liquid water only and not to moisture-vapor. This is emphasized in the following quotation appearing in one of the Army Ordnance manuals:

"Many waterproof materials permit immeasurable transmission of moisture-vapor. To resist corrosion by this transmitted moisture-vapor and also by moisture condensed from included air volumes, is the function of the applied preservative. If the parts are made of corrosion-resisting alloy or are plated or painted, the applied preservative may be light or it may be left out. This, however, should be done only when it is definitely known that the painting or plating offers the protection to all surfaces, and that this protection is equivalent to that obtained from satisfactory preservatives. In any case, the combined wrap and the seal must present a continuous waterproof surface. Small breaks, holes, or cuts will greatly reduce the effective life of a package or even cause excessive corrosion by retaining admitted water or other corrosive agents. As in Method I packaging, the wrapper immediately next to the part should retain preservative on parts surfaces, and be non-corrosive. This may require an extra underwrap if the waterproof wrapper is not both greaseproof and non-corrosive."

In either case, the wrap should conform to the part or assembly so as to exclude as much void space as possible thus reducing the amount of enclosed air volume containing moisture and contaminated atmospheres.

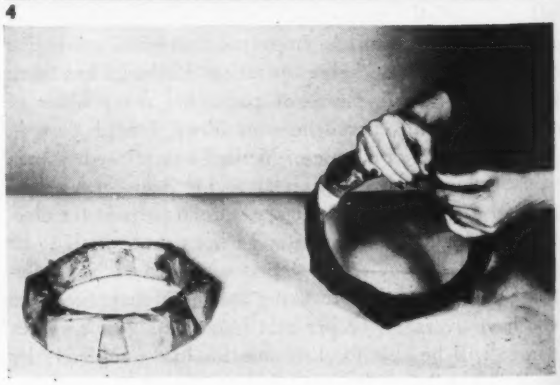
A protective dipping compound known as ethyl cellulose has been used recently to waterproof metal parts This protective coating material probably best accomplishes the exclusion of void spaces. Ethyl cellulose was developed at the request of a metal parts manufacturer desirous of obtaining an easily applied protective coating for metal parts—such coating to cut down the time in-

Postwar shipping will profit by wartime developments. Photos illustrate packs utilizing JAN specs. 1—Parts enclosed in greaseproof wrapping material then wax dipped comply with Method I-A. 2—Variation of "doughnut" wrap for flanged parts is included in Methods I and I-A. 3—Multiple protection of flexible corrugated material is which this part is being wrapped is in accordance with Method 1-A. 4—Another example of Method I pack shows use of greaseproof wrapping and cushioning material. Photos, Sherman Paper Products Corp.

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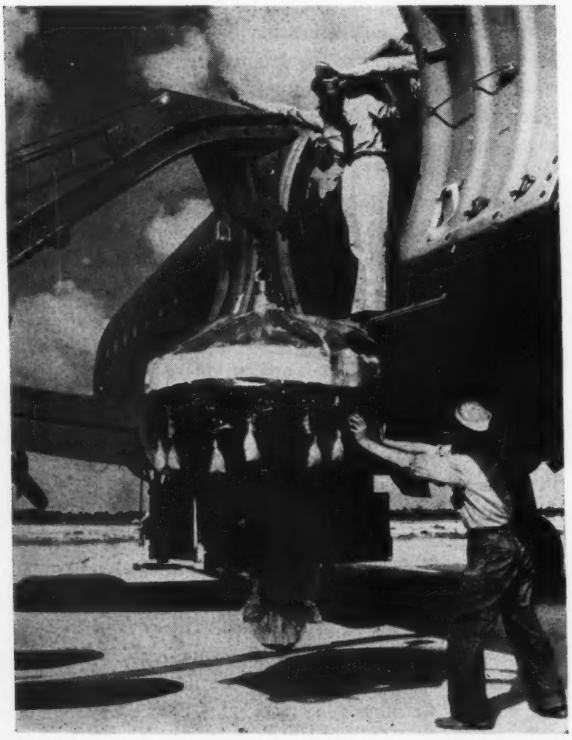
volved in factors of conventional wrapping procedure. Of all the plastic materials tested, ethyl cellulose dipping compound was found to possess the heat stability, toughness and protective properties necessary for such a melt and, as a result, commercial production of ethyl cellulose was undertaken.

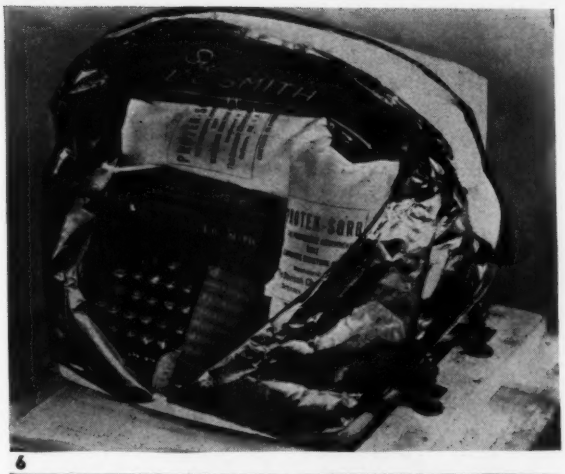
The tight-fitting protective coating is applied in a molten state which cools rapidly to form a skintight layer of waterproof, abrasion-resistant, corrosive-resistant material, able to protect from mechanical damage such parts as the machined surfaces of axle shafts, complete axle assemblies, connecting rods, gears, intake and exhaust valves and all other metal parts having external continuous surfaces.

First the part is cleaned—application of preservatives being optional. However, if preservatives are used and the part is properly drained, ethyl cellulose dipping compound can be applied with no bad effects. The application of ethyl cellulose can be accomplished either by hand or mechanical dipping. Mechanical dipping allows greater uniformity of coating, and subjects parts to less individual handling, thus reducing danger of contamination. The coating reaches its permanent state almost immediately after removal of the part from the dip, depending upon the cooling effect of the metal and surrounding atmosphere. Normally, ethyl cellulose peels off easily after the coating is slit, leaving the part in condition for immediate use. However, complicated surfaces may render the removal of coating impossible and, in such cases, the ethyl cellulose treatment should be avoided. For further information see *Plastic Strip Coating* p. 597.

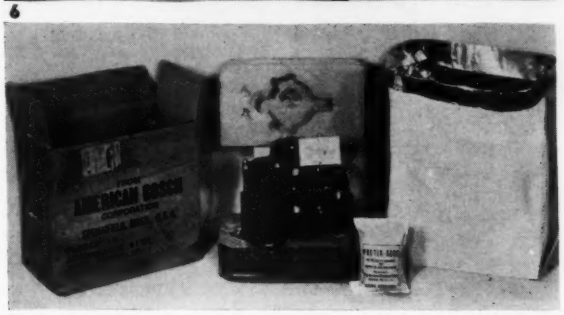
5—A Method II application with postwar significance. Aircraft engine packed in a plastic film moisture-vaporproof barrier with silica gel (floating barrier application). 6—Another typical postwar application of Method II is this L.C. Smith typewriter protected by metal foil and dehydrating agent (floating barrier application). 7—Assembly manufactured by the American Bosch Corporation packed by Method II in metal foil moistureproof barrier with silica gel. (Note convenient humidity indicator card.) Photo, The Franklin Institute.

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Method II

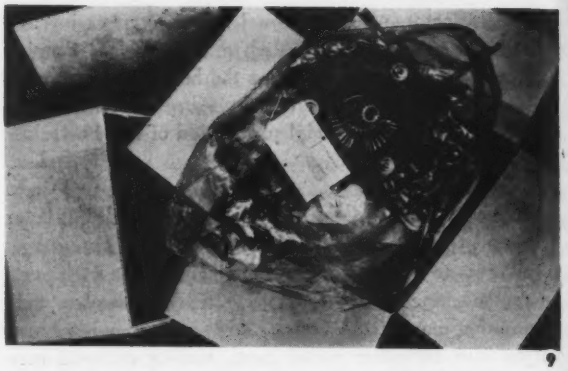
This is another method developed just prior to the war and undoubtedly it will find application on a very wide scale in postwar work. This is particularly true for long-time domestic storage and export items because Method II offers long-time positive protection to complicated parts and assemblies. Speaking in terms of peacetime applications, such items as electric motors (all sizes), generators, sewing machines, cash registers, comptometers, computing machines, business machines, sporting arms, radio and electronic equipment, complete engines (both auto and aircraft), optical instruments, precision time pieces, typewriters, and like items may well continue to be packed by Method II. On their export shipments of such items, manufacturers have reported a very high percentage of replacement parts due to corrosion damage. The experience we have gained during the war era has definitely proven that this condition can be minimized—an advantage which will certainly be attractive to manufacturers concerned.

Method II has been developed over several years and it has today reached a new high in perfection. Some time before we entered the present conflict, there was consider-

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Other Method II applications. 8—Metal foil and dehydrating agent protect Bausch & Lomb binoculars. 9—Hydraulic and vacuum assembly in plastic film with silica gel. Photos, The Franklin Institute.

able experimentation in packing complicated, delicate parts and assemblies by means other than dipping in a compound and subsequently wrapping in greaseproof material (Method I). Army and Navy Air Corps engineers in studying the corrosion problem on metals found that if moist, contaminated atmospheres could be excluded from the part or assembly, corrosion would not occur. They reasoned that if a moistureproof barrier could be made to enclose the part to be protected, and if the trapped air volume inside the barrier could be decontaminated and dehydrated by some means, the danger of the part or assembly corroding would be eliminated—provided the package design and materials employed performed good functional jobs. After considerable experimentation, it was found that Pliofilm offered adequate protection against moisture-vapor penetration.

The use of Pliofilm in conjunction with silica gel (in cloth bags) produced a higher degree of corrosion prevention than anything previously tried. Pliofilm could be heat sealed to form a relatively airtight, transparent barrier, and silica gel decontaminated and dehydrated the trapped air volume inside the barrier.

When the desiccant absorbs its limited capacity of moisture, it must be recharged. An ingenious color indicator enclosed in the package is used as a signal; when the upper limit of the safe humidity is reached, the indicator changes color. Therefore, the transparency of the Pliofilm, showing the indicator, is important.

Silica gel—chemically inert and of cellular construction—was found to absorb contaminated atmospheres and moisture-vapor by physical means only. This eliminated any possibility of harmful chemical reaction.

The first conclusive test incorporating this new method was conducted on aircraft engines by the Army and Navy Air Corps with industry's cooperation, and it was shown to be a safe, improved method of preserving complicated assemblies. It was found, too, that many hours could be saved, especially in the field of operation, if Method II were used. This was possible since, instead of heavy dipping preservative, which had to be removed before the assembly could be used, only light working preservatives were necessary and in some cases no preservatives at all. Thus, the equipment was rendered readily available for immediate use for further assemblies. This advantage was quickly recognized by the Air Corps services and the method immediately adopted. They wrote specifications on materials and packaging procedures which have been followed since with the highest degree of satisfaction. Following the Air Corps specification, the Army Ordnance issued a specification describing Method II as an approved means of packaging some of their equipment. Soon after this, the other branch published similar specifications and now most of those packaging metal parts and assemblies have evolved their own specifications for Method II.

As described in the Army and Navy Air Corps Specifications, Method II is "primarily designed to afford protection in shipment and storage to parts and equipment for the nature and intended use of the unit, the destination of the unit, and the adaptability of this type of preservation and packaging to the unit, precludes other methods of packaging. Units adapted to this method, by virtue of their nature, may be expected to include engines, electrical and radio equipment, delicate instruments, propeller hubs, guns and other equipment where failure to provide for proper depreservation would be resultant in appreciable hazards to the unit and personnel involved in its use. Those adapted to this method, by virtue of destination, may be expected to include any equipment destined for war zones or other critical areas where equipment and time for depreservation prior to use will not be available. Those adapted, by virtue of their adaptability to the processes involved, may include all units whose shape, size, delicacy or other factors preclude other methods of



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PACKAGING MATERIALS FOR GOVERNMENT ORDERS

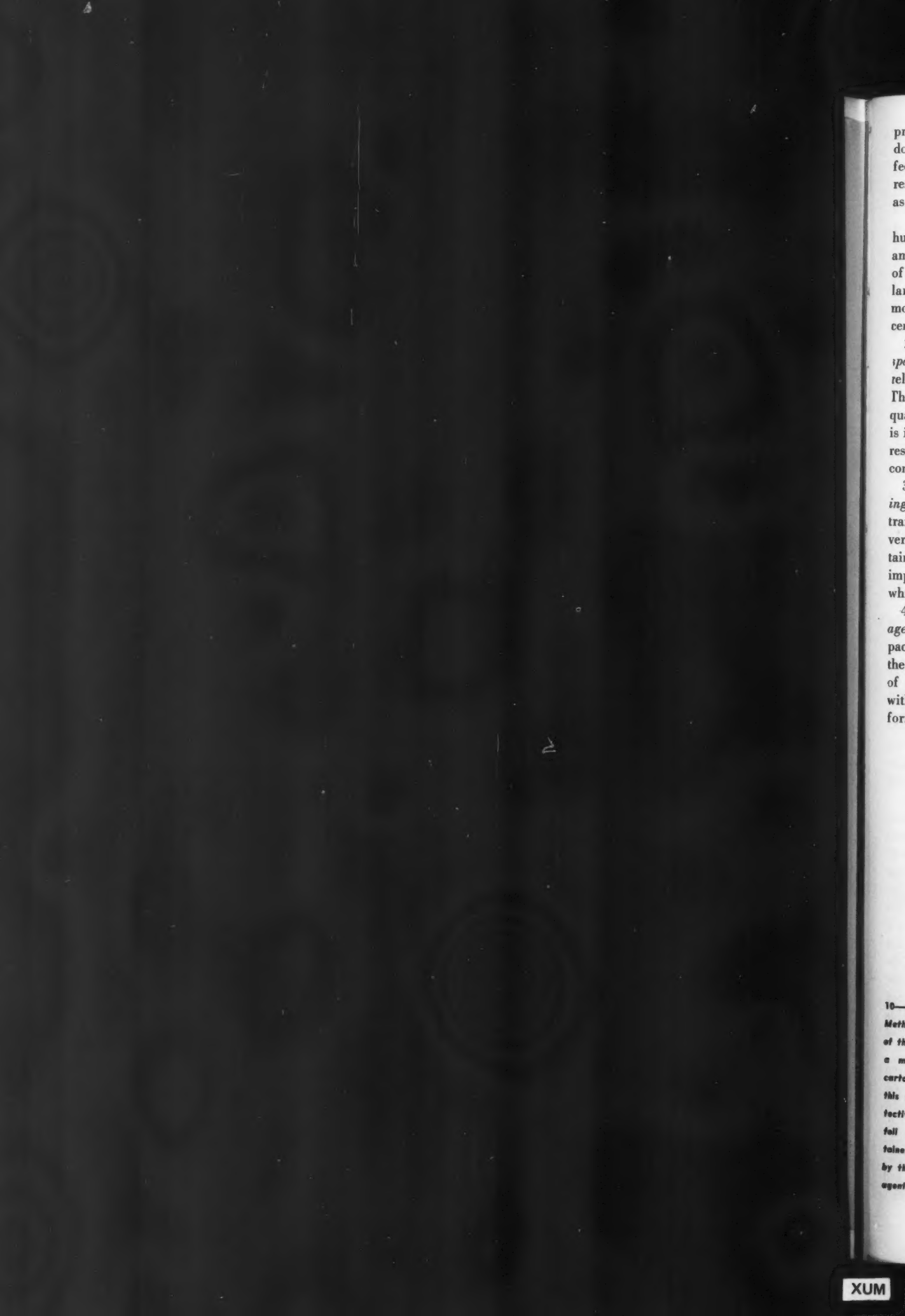
MATERIAL	WAR USES	SPECIFICATIONS	SPECIAL PROPERTIES	CONSTRUCTION	MATERIAL MANUFACTURED BY
Heat-sealable coated lead foil, kraft and cloth	Method II—parts, assemblies, electrical and delicate equipment, large or small	100-14A[1] 39P-16A[1] AN-P-13 AN-C-67b AXS-1322 AXS-1414 AN-P-36a	Nearly zero water vapor transmission; strong and durable, capable of strong heat seals	Polyvinyl butyral coated lead foil laminated to kraft adhered to cloth	Reynolds Metals Co. Shellmar Products Co. Valley Industries
Heat-sealable coated lead foil, kraft	Method II—parts, small assemblies, electrical and delicate equipment, Ration C, accessory pouch, small arms, ammunitions	100-14A 39P-16A AN-P-13 AN-C-67b AXS-1322 AXS-1414 AN-P-36a	Nearly zero water vapor transmission; strong and durable, capable of strong heat seals	Polyvinyl butyral coated lead foil laminated to kraft paper with flexible asphaltic laminated agent	Reynolds Metals Co. Shellmar Products Co.
Heat-sealable coated aluminum foil to cellulose acetate	K Ration components, beverage powders, powdered coffee, prophylactics	C.Q.D.—23E	Nearly zero water vapor transmission; light weight and bulk, strong heat sealing	Vinyl lacquer on aluminum foil laminated with colored adhesive to printed cellulose acetate	The Dobeckmun Co. Milprint, Inc. Shellmar Products Co.
Heat-sealing cellophane laminated to lead foil to kraft	Bulk packaging of dehydrated foods—special uses under Method I-A for Grades B and C for metal parts	C.Q.D.—59E, 72E 74C, 60E 100-15	Nearly zero water vapor transmission; strong, heat-sealable	Lead foil laminated to kraft with asphaltic agent. Added lacquer coating on cellophane laminated to metal side	Reynolds Metals Co. Shellmar Products Co.
Heat-sealable coated aluminum foil laminated to kraft	Small Method II applications such as electrical parts Certain Method I-A applications such as bearings	AXS-1322 AN-C-67b AN-P-13 72-0-6 AXS-1414	Nearly zero water vapor transmission; flexible, lends itself readily to automatic package-making equipment	Heat-sealing lacquer coated on aluminum foil to which a brown kraft sheet has been laminated	Plastic Film Corp. Rapinwax Paper Co. Shellmar Products Co.
Heat-sealable coated aluminum foil laminated to laminated kraft	Small Method II applications, certain Method I-A applications for small metal parts	AXS-1322 AN-C-67b AN-P-13	Nearly zero water vapor transmission; tough, heat-sealable, high tensile strength	Heat-sealing lacquer coated to aluminum foil which has been laminated to a laminated kraft backing which has been combined by a plastic laminant	Rapinwax Paper Co. Shellmar Products Co.
Heat-sealable vinyl—aluminum foil—vinyl-cloth	Method II—parts, assemblies, electrical and delicate equipment, large or small	AXS-1322 AN-C-67b AN-B-20	Nearly zero water vapor transmission; very flexible, tough and heat-sealable	Cast vinyl material on aluminum foil which has been combined to a cast vinyl and cloth backing	The Dobeckmun Co. Plastic Film Corp. Shellmar Products Co.
Vinyl films	Waterproof flexible strong protective covers for rifles, sub-machine guns, and pistols—QM equipment	P.Q.D.—377B	Waterproof, greaseproof; flexible with strong heat seals	Single-ply, heat-sealing	B. F. Goodrich Co. Carbide & Carbon Chemical Corp. Celanese Celluloid Corp. Firestone Tire & Rubber Co. Goodyear Tire & Rubber Co. Gordon Lacey Chem. Prod. Co.
Laminated pliofilm	Method II—airplane engines and parts	AN-O-P-406 AN-P-54 AN-E-1a AN-C-67b	Low water vapor permeability; transparent, flexible, heat-sealable	Two-ply pliofilm with flexible, strong laminating agent	Goodyear Tire & Rubber Co. Shellmar Products Co.
Laminated cellophane[2]	Bag for Ration K, etc., certain types of bombs	C.Q.D.—28G	Low water vapor transmission; durable and heat-sealable, water resistant	Flexible, heat-sealing anchored coated cellophanes with flexible, waxy laminating agent	The Dobeckmun Co. Menasha Products Co. Shellmar Products Co.
Grade A materials[3]	Wrapper or package for precision parts—Method I or I-A (if waterproof or sealable)	100-15 100-14A 39P-16A	Greaseproof, non-corrosive, wax free, red color	AXS-840, Revision I, is a performance specification which can be met by many materials and combinations. Greaseproofness is obtained by coatings, glassine, cellophane, and cellulose acetate. Strength by papers or transparent films alone, or multi-ply, or with cloth	Suppliers listed by Forest Products Lab.
Grade B materials	Wrapper or package for non-precision or non-metallic parts—Method I	100-15 100-14A 39P-16A	Greaseproof; wax free; no color added	AXS-840, Revision I, is a performance specification which can be met by many materials and combinations. Greaseproofness is obtained by coatings, glassine, cellophane and cellulose acetate. Strength by papers or transparent films alone, or multi-ply, or with cloth	Suppliers listed by Forest Products Lab.
Grade C materials	Wrapper or package for precision parts—Method I-A	100-15 100-14A 39P-16A	Greaseproof, non-corrosive, moldable and sealable; green color	AXS-840, Revision I, is a performance specification which can be met by many materials and combinations. Greaseproofness is obtained by coatings, glassine, cellophane and cellulose acetate. Strength by papers or transparent films alone, or multi-ply, or with cloth	Suppliers listed by Forest Products Lab.
Vinylidene chloride (saran)	Method II—machine guns, optical instruments, gun turrets and other aircraft assemblies	AN-C-67b AXS-1322	Strong, flexible, transparent, low water vapor transmission	Extruded tubes and prefabricated envelopes	Dow Chemical Co.
Creped kraft and asphaltic laminant (multi-ply materials)	Waterproof package or carton liner for many uses—special Method II applications	100-14A 39P-16A	Flexible, tough, waterproof, pressure-sealable	Multi-plies of stretchable materials with asphaltic laminant	Cincinnati Industries

[1] This reference is the *Army-Navy General Specification for Packaging and Packing for Overseas Shipment*, U. S. Army Specification No. 100-14A, U. S. Navy Specification No. 39P-16A. This manual also covers many other agencies and gives the basic intent and requirements of many materials and methods.

[2] The bulletin, *Military Parts Packaging*, by the Cellophane Division of E. I. du Pont de Nemours & Co., Inc., September 15, 1944, gives more details on the uses of cellophane. This bulletin is an excellent condensation of metal parts packaging and lists many specifications and uses.

[3] Many other war agencies have detailed specifications for various and specific applications of these or similar materials.

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preservation." Specifications written by the other services do not carry the same wording; they do, however, in effect, say the same thing. The effectiveness of Method II rests equally on the four interdependent factors listed as follows:

1. *The volume of the enclosed air space* — Relative humidity is the measure of any given temperature of the amount of moisture which is contained in a given volume of air. The larger the volume of air to be dehydrated, the larger will be the quantity of moisture which must be removed to lower the relative humidity to the desired percentage. Thus, air volume should be at a minimum.

2. *The area of the surface wrapper enclosing the space*—All flexible moistureproof barriers are merely relatively impervious to moisture-vapor penetration. Thus, the larger the surface area, the greater will be the quantity of moisture-vapor which will pass through it. It is important, then, that the barrier be so constructed as to result in the minimum surface area consistent with the control and volume of the assembly.

3. *The moisture-vapor transmission rate of the enclosing barrier*—The quantity of moisture which will be transmitted to the moisture barrier under normally adverse conditions is far greater than that originally contained in the air of the enclosed volume. It is, therefore, important that the most moisture-impervious material which is applicable to specific conditions be used.

4. *The quantity of the absorbent included in the package*—The quantity of silica gel to be used in a given package is determined by: (a) the total surface area of the barrier (b) the volume of the barrier (c) the amount of dunnage (wood, corrugated material, etc.) enclosed within the barrier (d) length of time of protection. The formulas used to determine the proper amount of silica gel to be used in the package are, for the most part, nearly the same for all branches.

Some specifications ask for protection for 6 months, while others require that the part be preserved 12—18 months. One branch, as an example, uses the following formula for one year's protection:

Pounds of desiccant = 0.2A plus ½ D

Where A is the area in square feet of the barrier, D is the weight in pounds of any dunnage or blocking material enclosed in the barrier.

Another branch in making the study of the various moisture-vaporproof barriers available has designated three different formulas depending on the protection which the barrier material offers, for example:

Moisture-Vapor Transmission Rate of Creased Samples *grams per 100 sq. in. per 24 hr.*		Silica Gel Formula
Type I	Up to 0.05	0.15A plus ½ D
Type II	Over 0.05 to 0.15 inclusive	0.3A plus ½ D
Type III	Over 0.15 to 0.25 inclusive	0.5A plus ½ D

A is the area in square feet of the barrier, and D is the weight in pounds of any dunnage within the barrier.

By classifying the barriers in the above manner, setting up separate formulas for each type, and by using corresponding amounts of silica gel, certain savings can be effected. Without question, other economies will be noted (as the method is further developed) which will be attractive to manufacturers for peacetime application.

The proper design and engineering of a Method II application cannot be stressed too much. There are certain fundamental rules for good practice in applying Method II which may be summarized as follows:

10



10—Possible postwar applications of Method II are illustrated by packing of this Bausch & Lomb microscope in a moisture-vaporproof barrier. The carton-barrier-carton application of this method comprises an inner protective carton and a barrier of metal foil in addition to the outer container. Further protection is afforded by the employment of a dehydrating agent. Photo, The Franklin Institute.

XUM

1. Select for the moisture barrier the most moisture-impervious material applicable.
2. Design the barrier so it shall have the minimum surface area consistent with its application.
3. In the design of a package, the hygroscopic dunnage used inside the moisture barrier should be kept to a reasonable minimum.
4. Joints and seams must be moisture-impervious.
5. Use adequate silica gel.
6. Use only activated silica gel; never use saturated or partially saturated material.
7. Do not open the container in which the silica gel is shipped or stored until immediately before use. Close the container between uses.
8. Avoid purchasing silica gel in large shipping containers unless it is intended to use all the contained material in a minimum number of openings.

Standardization of design has been complete in Method II applications. It is important to note in postwar thinking that Method II applications need not be limited to any particular size or weight. Units weighing over 10,000 lb. have been very successfully packed by Method II. Barriers as large as 200 in. by 400 in. properly designed and set up during the war years will be readily applicable to peacetime use. Item requiring Method II can be packed by one of four classifications:

Class A—floating bags—This type of construction found its widest use on heavy, large items or items which could be safely handled by mounting them to a base or pallet. Moisture-vaporproof barriers designed as floating bags are prefabricated with gaskets already fixed to the barrier material. These gaskets conform to the mounting points on the part to be packed and also the holes in the base, where the bolts are shoved through. These gaskets have a two-fold purpose. (1) They protect the barrier on both the inside and outside at the points of pressure. (2) They form a cushion for the part to be packed since the gasket materials used have resilient qualities. Items such as generators, electric motors, etc., which fall into this category, can easily be packed in this manner with the highest degree of protection.

Class B—carton-barrier-carton—This type of construction has been widely used on parts of medium size and weight. It has been found that items weighing as much as 250 lb. can be safely packed by the carton-barrier-carton construction. The part to be packed is placed in an inner carton and properly cushioned, after which the silica gel is tied on. The inner carton is closed and then placed in a fabricated moisture-vaporproof barrier. This entire unit is then lowered into an outer carton, after which the barrier is sealed (in most cases by heat) and the outer carton is subsequently closed. Portable typewriters, transmitters and cash registers could be considered items to which the carton-barrier-carton construction is applicable. And there are items being packed by this construction at the present time.

Class C—carton overwrap—This construction is the same as the carton-barrier-carton with the exception that the outer carton is not used. Further, because of the moisture-vaporproof materials which are approved for this particular construction, the size and weight of the item which might be packed is more limited than in the case of carton-barrier-carton packing. Certain small electrical equipment as well as automotive pieces have been and probably will be packed after the war by the overwrap construction described here.

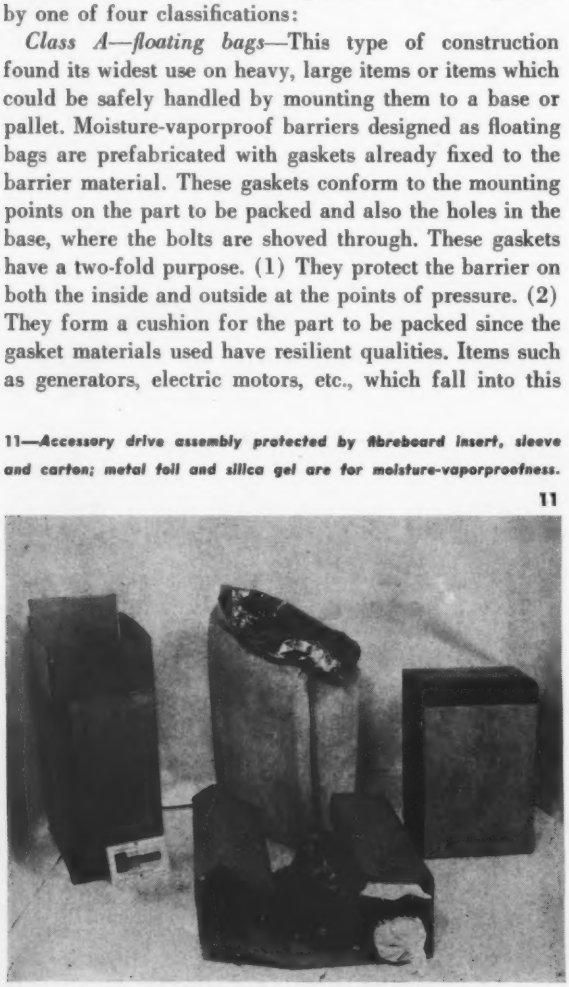
Class D—cushioned bag—Limited still more is the cushioned bag method which currently specifies a 5-lb. maximum weight limit. The part is first wrapped in a cushioning agent, silica gel is placed usually inside of the cushioning material, and the entire assembly is then placed in the moisture-vaporproof barrier. The barrier is sealed against the entry of moisture-vapor and subsequently in another cushioned agent. Thus, the barrier is sandwiched between the two layers of cushioning material. Such peacetime items as sporting arms could well fit into this construction.

The war has definitely taught us one thing—to be packaging conscious. Except in rare cases, the packaging room before the war was regarded as a non-productive department. Experience and time have shown how wrong this thinking was. We now know that the acceptance of an item is directly dependent upon the condition in which the consumer receives it, and we also know that accepted safe practices in the packaging room can reduce the spares which most manufacturers find necessary to include in their shipments. Great strides have been made in the lubricants, preservative compounds, waterproof materials, moisture-vaporproof materials and other fields for packaging materials and these have greatly improved techniques in packaging.

During wartime, of course, no thought has been given to the attractiveness of the countless packages which have been designed. This factor is a consideration which must be given complete study for peacetime application. Packages after the war will definitely reach a new high in consumer acceptance because, as well as being attractive, they will be functional—using techniques developed for war. (See *Packaging for Government Orders*, p. 96.)

11—Accessory drive assembly protected by fibreboard insert, sleeve and carton; metal foil and silica gel are for moisture-vaporproofness.

11



XUM

Steel and fibre strapping

Getting shipments to the front lines in good condition has been a factor of such really vital importance during the war years that a new emphasis has been placed upon packaging problems which exist beyond the production line. However, though in peacetime an unproperly packed shipment may not loose lives or battles, care in packing and reinforcement will remain a major consideration. Packing specifications of the armed services have been revised to meet the unusual situations found in loading and in unloading cargo at arctic and tropical bases, many without docks and without proper handling facilities. Ration packs, food, ammunition, planes, tanks and the thousands of other items needed for long campaigns, *must* arrive safely.

And in packing, space must be conserved to permit maximum loading with our limited transportation facilities. This too, has focused attention on shipping practices. From this war will come lessons to be used in the packing of the multitude of peacetime products (for domestic and export delivery) which may soon roll from America's production lines.

Lighter containers made stronger, bundling to eliminate outer wraps, skid and pallet loading and the bracing of carload ladings are the principal developments in which flat steel bands have participated. Packing operations are speeded up and will be more so as faster strap-applying equipment becomes universally employed. Unloading, too, will be faster as the mere snipping of the steel bands prepares the loads for the receivers. Thus, handling costs will be lowered, an important factor in postwar competition.

Manufacturers, whose new or prewar products will again appear in the market places, should prepare now to devise packing methods which will deliver their products safely and economically. Safely, because properly packed shipments will make friends at home and abroad. Economically, to capture or share markets which other American and foreign producers will strive to hold.

Besides its function in reinforcement, steel strapping often reduces shipping costs by permitting the use of lighter, less expensive containers. It speeds up the handling of materials by making skid-shipping practical, safe and economical.

Strapping also permits the baling of many items—notably textiles—which conserves valuable shipping and storage space yet fully protects the commodity. The use of strapping to brace carload freight has directly lessened claims for damages, cut freight bills by reducing dunnage, and speeded up and simplified loading and unloading operations.

The value of reinforcing a shipping pack with steel strapping has long been recognized by the U. S. Government, whose *Federal Standard Stock Catalog* includes strapping as an integral part of the packing specifications for a number of commodities. Specifications QQ-S-781, 42-S-11 and NN-B-621A cover strapping as required by the various branches of the Federal Government.

Types of strapping

Steel strapping is available in two types, nailed and nailless.

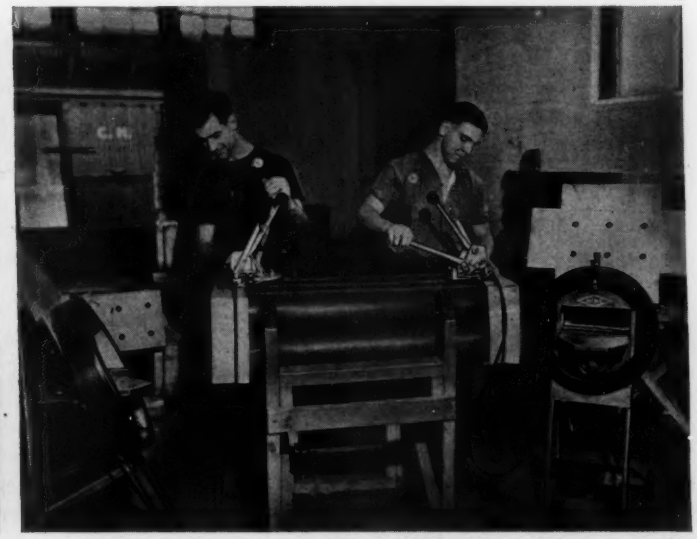
Nailed strapping necessarily confined to wooden pack-

1—Steel bands, which may easily be applied by women war workers, protect the supercharger of a fighting plane while in transit to the assembly plant. 2—Ammunition tubes, formerly packed in containers, are protected by steel-strapped fibre caps. Photos in this article, Acme Steel Co.

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XUM



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3—Cans of food go to market in fibre containers which are strapped with steel. Strapping operation is facilitated by a convenient coil.

ages, is held in place (usually at the extreme ends of a box) with nails. Since the application of nailed strap can seldom maintain the speed required in modern shipping rooms, the use of it is diminishing except for export packs and to reinforce boxes of bottles, lugs, tote boxes, etc. Strapping to be nailed is usually annealed (soft) to facilitate nailing—although some kinds are furnished with nail holes already punched. (See Table I).

Nailless strapping developed rapidly in recent years as improved equipment has accelerated the operation to keep pace with fast moving production lines. The strapping is first pulled tight around a package and the two ends are joined together with a metal seal. Separate hand tools (stretcher and sealer) and a one-piece, automatic device to tighten, seal, and cut the strap speedily are available for every type of shipping pack from parcel post to carload ladings.

Proper application requires that the tension on the strapping be sufficient to cut the corners or edges of the box slightly. Straps should always be applied at right angles to the edges of the pack so that the reinforcement will sit squarely on the box.

Nailless strapping is ordinarily furnished in coils weighing 60—100 lb. each; coils of measured length and cut lengths are also available for special applications. The black painted or lacquered finish is the most widely employed although zinc coated (galvanized) is preferred by some shippers especially for export or where it becomes necessary for the packages to be stored for long periods of time. (See Table II.)

Wooden boxes

Based on literally thousands of tests conducted by the Forest Products Laboratory (U. S. Department of Agriculture) at Madison, Wisconsin, the thickness of lumber for the top, bottom, and sides of a nailed wooden box can be safely reduced 20—40 per cent when the package is properly strapped. (See Table III.)

Suggested sizes of steel strapping for various gross weights of packed containers are given in Table IV. These recommendations are not arbitrary because the nature of the product, method of handling, internal packing requirements, kind and grade of lumber used, nailing, and construction are important factors which must also be considered.

A single strap should be placed around the middle of the box. When two straps are employed, each should be ⅙ of the length of the box from the ends. With three straps, the outer two should be at the same distance and the third at the middle. Three or more straps are suggested for relatively long packages.

A recent popular development is the strapping of wooden containers to hold the cover in place without the use of nails. To open the package, receivers merely snip the straps. As the cover is intact, such boxes can be re-used for shipping or storage.

Wooden crates

Steel strapping is valuable to keep the several parts of a crate in position and add the strength needed to withstand abuse in transit. As is the case with wooden boxes, the thickness of the lumber in a crate can usually be safely reduced. Whenever possible the straps should be applied around the short dimensions of the crate, over the slats. As an extra precaution U-shaped staples are sometimes nailed into the cleats over the bands.

Steel strapping is also used to brace products within crates to prevent internal shifting. Cartons holding the separate parts are sometimes strapped to the bottom or sides of crates containing stoves, machinery, washers, etc.

Cartons

By providing a greater margin of safety, steel strapping often permits the use of fibre and corrugated containers for products that would otherwise have to be packed in more expensive packages.

Many items, particularly textiles, can be shipped in "overloaded" cartons at lower freight rates when steel strapping is employed. For data on specific products, consult the Consolidated Freight Classification.

Two or more cartons can be strapped into conveniently handled units, which prevents individual packages from being lost. Only one shipping label is required.

The Express Classification requires that packages weighing less than ten pounds be charged at the rate for that weight, but if two or more such packages are strapped into a single unit for one consignee, the rate is based on the aggregate weight. For example, three 9-lb. packages

shipped individually would be billed at the express rate for 10 lb. each or a total of 30 lb. If these cartons were strapped into a single package for one destination, the shipper would pay on the basis of only 27 pounds.

Internal bracing of furniture, such as novelty tables, is easily accomplished with steel strapping. To prevent movement and consequent damage, the product is firmly held to the base or top of the carton. The actual strapping of the container is done from the outside.

Fibre and corrugated wraps

Adequate protection to such diversified products as studio couches, steel shelving, safes, metal bars, desks and mill-work is made possible with fibre or corrugated wraps held in position by steel bands. The savings in packing, in material, in time which result from this practice are obvious. The receiver also benefits as snipping the straps quickly opens the package.

No general rule as to strap sizes can be formulated for specific products as individual packing practices vary. However, the vast possibilities for reducing shipping costs with steel-strapped wraps warrant investigation.

Bundling

The method of bundling is practical only on products that do not need protective covering.

Definite appeal to shippers for packages of this kind can be obtained by having the company name, slogan, sales message, or trademark printed continuously on the strap. It thus becomes a new advertising medium.

Baling

Baling received its greatest impetus after World War I when shippers learned the savings which the Government had effected with this type of pack.

Obviously many products cannot be baled but, in general, any item that can be compressed is suitable for baling. Some of these are bags, bedding, blankets, cloth, dry goods, feathers, fur, hair, hemp, hides, kapok, leather, mattresses, piece goods, pulp, towels woolens and yarns. Valuable storage space is saved, costs of transportation (especially on freighters), handling, and packing are materially reduced.

Burlap or waterproof paper is generally used as a covering material, and the straps are applied while the bales are under compression. Tension is not required as expansion of the bale when released tightens the straps and takes up any appreciable slack.

The number of straps required depends upon the size, weight, and value of the baled contents. For small bales, four bands usually suffice—others may require from five to ten. The $\frac{5}{8}$-in. and $\frac{3}{4}$-in. widths of strapping are employed on almost all types of bales.

Skids

By moving production on steel-strapped skids it is possible to speed up the handling of materials, conserve valuable storage space, reduce the possibility of accidents to workmen, decrease claims for damage, increase good will in customers and substantially cut costs.

Paper manufacturers were the very first to recognize the possibilities of skid shipping and this method has been accepted as standard for years by paper shippers and receivers alike. Consider the added costs for packaging and labor if paper could not be steel-strapped to easily movable skids—weighing up to 5,000 pounds each, and handled by one man! Steel producers are also large users of skids which not only permit easier unloading of cranes but also enable one man with a lift or power truck to move easily loads weighing several tons.

The automotive industry has adopted skid shipping with excellent results for the manufacturers of both automobiles and parts. Products such as clutches, bumpers, mufflers, steering gears, oil filters, axles, wheels, wheel frames, springs etc., and transmission units are a few of the items that move safely and economically on skids.

Packaged articles in cartons and boxes are also placed on steel-strapped skids for ease in handling. Practically every industry can advantageously use this modern shipping method for inter-plant movement and delivery to the customer.

Some skids are designed for one trip and are non-re-

4



4—Ration packs are "bound to get there" when steel bands are used around the cartons. In this case, the operation is semi-automatic. The strapping is fed from rigid standards which are adjacent to the conveyor.

turnable. The construction of the skids is important and the entire application requires study to meet conditions of stowing, storage and customers' facilities. Lift truck and strapping manufacturers have accumulated a wealth of available information on this subject.

Carload ladings

The effectiveness of strapping extends also to carload ladings. Straight and mixed loads, pool and stop-over cars can also enjoy the benefits of strapping.

That the carriers recommended strapping for many commodities is evident from the publications of several divisions of the Association of American Railroads. Carriers use strapping in their own terminals for bracing LCL or merchandise cars and for re-coopering broken packages.

In box cars, steel bands are applied to half-car units of freight, which permits them to absorb rather than resist shocks during transportation. Bands are also used to anchor products in box cars as well as on gondola and flat cars. Strapping is employed to brace doors of the cars using a special strapping with high tensile strength for this purpose. Tools are available to brace all types of ladings.

Strapping setup important

Steel strapping can be used advantageously only when the proper equipment is installed and the correct size of band is applied. Some packages lend themselves to automatically seal-fed strappers, mounted as an integral part of the production line; others require hand tools. In some instances movable stands for the reels are advisable while in others stationary coil holders, mounted from the ceiling or placed on the shipping floor, will permit the most efficient application of strapping.

Strapping has become a vital part of the packing operations in every industry. It is rapidly being recognized that what happens to a product *after* it is made is equally as important as any situation confronted by the sales, engineering and production departments.

TABLE I.—NAILED STRAPPING: SIZES AND WEIGHTS

.015 IN. THICK: LIGHT- AND MEDIUM-WEIGHT PACKS

Width in in.	*Small coil*		*Large coil*		*Estimated pounds per 1,000 ft.*
	ft.	*lb.*	*ft.*	*lb.*	
⅜	300	5.7	4,000	76	19.1
½	300	7.6	3,000	76	25.5
⅝	300	9.6	3,000	96	31.8
¾	300	11.5	2,000	76	38.2
⅞	300	13.4	2,000	89	44.6
1	300	15.3	1,500	76	50.9

.028 IN. THICK: HEAVY AND BULKY PACKS

Width in in.	*Small coil*		*Large coil*		*Estimated pounds per 1,000 ft.*
	ft.	*lb.*	*ft.*	*lb.*	
½	300	14.2	3,000	143	47.5
⅝	300	17.8	2,000	119	59.4
¾	300	21.4	2,000	143	71.3
⅞	300	25.0	1,500	125	83.2
1	300	28.5	1,500	143	95.1

TABLE II.—STANDARD SIZES OF NAILLESS STRAPPING

(WEIGHTS AND FOOTAGES ARE APPROXIMATE)

Width, thickness in in.	*ft. per lb.*	*lb. per 1,000 ft.*
¼ × .015	78.55	12.73
¼ × .020	58.89	16.98
⅜ × .010	78.55	12.73
⅜ × .012	65.45	15.28
⅜ × .015	52.45	19.10
½ × .010	58.89	16.98
½ × .012	49.06	20.38
½ × .015	39.22	25.47
½ × .018	32.75	30.56
½ × .020	29.44	33.96
⅝ × .010	47.13	21.22
⅝ × .012	39.22	25.47
⅝ × .015	31.41	31.84
⅝ × .018	26.18	38.20
⅝ × .020	23.32	42.45
⅝ × .023	20.48	48.82
¾ × .015	26.18	38.20
¾ × .018	21.81	45.85
¾ × 0.20	19.63	50.94
¾ × .023	17.05	58.58
¾ × .028	14.03	71.28
*¾ × .035	11.23	89.14
*¾ × .050	7.85	127.34
*1¼ × .035	6.73	148.58
*1¼ × .050	4.77	212.24
*2 × .050	2.95	339.60

* Sizes generally used for bracing carload freight.

TABLE III.—PERMISSIBLE REDUCTIONS IN LUMBER THICKNESS, THICKNESS OF SIDES, TOP AND BOTTOM OF WOODEN SHIPPING CONTAINERS, IN INCHES

Unstrapped	*Strapped*	
	one strap	*two or more straps*
⅞	⅝	½
13/16	⅝	½
⅝	½	⅜
9/16	7/16	5/16
½	⅜	5/16
7/16	5/16	¼
⅜	5/16	¼

(Data from Bulletin No. 14: Domestic Commerce Series; United States Department of Commerce.)

TABLE IV.—SIZES OF STEEL STRAPPING FOR WOODEN BOXES OF VARIOUS GROSS WEIGHTS

Gross weight of box in lb.	*Dimensions of strapping in in., when different number of straps are used*		
	one strap	*two straps*	*three straps*
50	½ × .020	⅜ × .015	.....
100	⅝ × .020	½ × .018	.....
200	¾ × .023	⅝ × .020	½ × .018
300	.....	⅝ × .023	½ × .020
400	.....	¾ × .020	½ × .023
500	.....	¾ × .023	⅝ × .023

XUM

Equipment for applying tape

by T. H. Krueger and M. W. Waggoner

Recent severe tests have demonstrated that good gummed tape, when properly applied, can withstand tough handling. Manufacturers of equipment for applying gummed tape have been making steady advances in the efficiency of their machines.

Many years ago, a tape-applying method, developed in Austria, depended upon moistening the tape with a felt wick or pad. This procedure was unsatisfactory, however, for in a relatively short time of operation a crust would form on the wick (due to drying gum scratched from the tape by previous dispensing), thus preventing water from reaching strips of tape subsequently run over the felt.

For some time American manufacturers sought to improve upon this method of applying tape. Based essentially upon the same operating principles as the Austrian equipment, however, the new American models also failed to perform a satisfactory moistening job.

A step in advance was made with the introduction of the roller-type moistener which operated by pulling a section of tape over a cylinder revolving in the water tank. This mechanism was more satisfactory than the original felt moistener because it delivered more water and was simple to maintain. However, because such appliances lacked proper tension and water control, tape often became soaked and slippery through the center—though remaining dry on both ends. In 1922 the "tear-off" tape sealer was introduced.

The principle of application for this type of machine is similar to the stroke of a painter's brush. Adequate water is distributed evenly over the complete gummed surface of the strip, thereby eliminating "dead" spots which cause blisters and "popping" tape.

Automatic pressure-control machines

Shortly after World War I, when corrugated cartons were gaining by rapid strides, a manufacturer of sealing tape machines introduced the first type of machine which successfully controlled the amount of moisture used in conditioning the glue on tape. These so-called "chute types" have been widely used—and are still popular today—where short lengths of tape are dispensed. The moistening unit consisted of an inverted brush set in tank of water upon which rested a bar of predetermined weight. This bar was pivoted in a manner that allowed it to maintain proper relationship with the brush regardless of the wear or bend of the brush bristles.

Automatic moistening-control machines

A new problem in the adhesion of gummed tape was introduced when users began demanding "setting time" of 4—5 seconds. At the same time, soft coarse jute containers were being replaced by harder and far less coarse kraft which contained a certain amount of sizing in the pulp for waterproofing effect. This advancement not only added to the ability of containers to withstand long trips, but allowed heavier and more valuable goods to be safely shipped in containers, if the seals were secure.

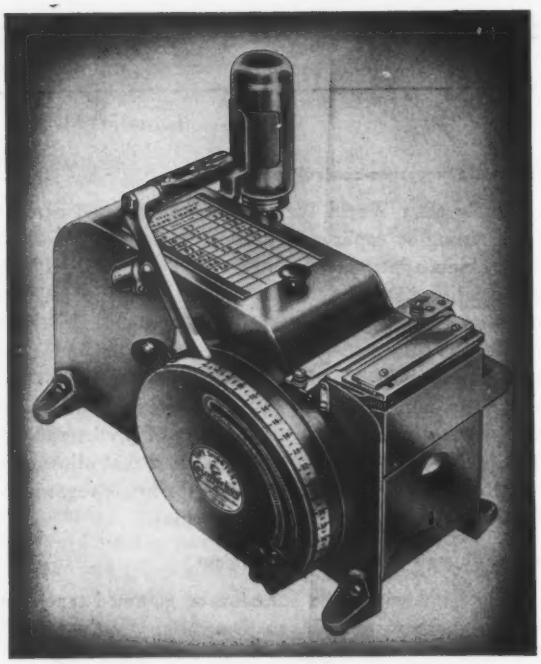
Automatic moistening control was developed to cope with these problems, designed to distribute evenly an increasing amount of water to the tape as it was expelled faster than ever before.

Automatic moistening control consists of two specific features: (1) an automatic control of the tape's pressure against the moistening brush; (2) the control of the water supply to the tape itself. These controls can be pre-



1—Sealing containers of dehydrated potatoes for the Army on a packaging line. Automatic moistening-control machine measures set lengths of tape, controls the moistening and cuts strip. Photo, Better Packages, Inc.

XUM



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2—Fully automatic machine for sealing cartons with tape. By merely pulling the dispenser handle, the tape is thoroughly conditioned for maximum adhesion. 3—Semi-automatic tape dispenser which gives correct, constant pressure to tape. Photos, Better Packages, Inc.

set to the exact pressure and quantity of moisture required to condition the tape correctly for maximum adhesion. A simple adjustment permits more or less water to flow into the moistening tank, where proper level of the water is maintained.

No sealing machine can possibly condition gummed tape to its anticipated adhesion during every season of the year without automatic water-supply control. Tape requires less moisture in hot, humid weather than it does during cold, wintry months. Consequently, *adjustable water-supply control* is of immeasurable assistance in obtaining maximum gummed-tape adhesion during *every season of the year.*

Some automatic moistening-control machines practically eliminate the packer entirely from the moistening picture, being only 10 per cent dependent upon his ability. By simply pulling a handle, tape is thoroughly conditioned for maximum adhesion. The strip is automatically cut upon release of the handle.

The American Railroad Association and the Gummed Industries Association, Inc., recognizing the importance of automatic moistening control to the safe sealing of shipments, recommend the use of taping machines equipped with this feature. We quote from a letter by O. H. Dietrich, Executive Vice Chairman of the American Railroad Association:

> When gummed tape loosens up, resulting in package failures in transit, the observations of our field inspectors indicate that such failures most often come from faulty application of the tape rather than failure of the tape itself.
>
> We, therefore, recommend a tape-moistening machine of the shipping room type (which handles tape up to four inches wide), equipped with automatic moistening control, be used, and that care be exercised that the brushes or other wetting devices, as well as the water tank of such machine, be washed thoroughly once a day in a solution of lukewarm water and soap and then rinsed in clear water in preparation for the next day's work.
>
> You, of course, appreciate that in recommending a device for properly moistening tape every such device on the market is included, and we do not endorse any particular dispenser to the exclusion of others which answer the purpose.

Importance of the seal

A shipping container is no stronger than its seal. The particularly vulnerable points of any container are the center breaks and horizontal end scores. Unless they are properly and securely sealed, the contents might as well be shipped in a paper bag. When a shipper considers the shocks and jolts a container might be forced to endure while in transit, his inclination is to be more careful in sealing it. Unfortunately, too little time in the past has been spent investigating this important phase of the manufacturing process. Today, more than ever, because of the pressure being placed upon shipping departments, hasty, haphazard sealing occurs too frequently. This is dangerous to the shipment itself—a risk we cannot afford during wartime—and it is also dangerous to the shipper's future relations with his customers.

Forming the bond

The permanent grip of gummed sealing tape is obtained by the "bond" formed between the soluble glue of the tape and the thousands of tiny "pores" of the carton through which the glue penetrates. In other words, when moisture is applied to gummed sealing tape, the glue dissolves into a flowable solution. When this solution of glue and water is applied to the carton skin, it penetrates into the dry porous surface. After the water has evaporated, these thousands of container surface pores are filled with pure glue from the surface of the tape. Tape, properly conditioned for maximum penetration, consequently, helps form an inseparable bond between tape and container. Any attempt to remove tape which has been thoroughly conditioned and correctly applied, could only be accomplished by also tearing the carton skin down to the line of glue penetration.

Special instruction charts on how to seal are furnished by machine and tape manufacturers. Proper rubbing makes certain that the tape rigidity grips the fibreboard surface until it "sets." These simple rules should be followed:

1. Rub with the palm of the hand, not the fingers.
2. Press and rub as though ironing.
3. Let the hand "follow" the box over its ends in one sweeping stroke.
4. Rub the full width of the strip. After a strip of tape has been centered over the section to be sealed, apply it and immediately rub from the center out. This eliminates any tendency for the tape to back-buckle. Apply extra pressure when rubbing the tape over the "corner" of end scores. Make certain the joint remains secure and tightly sealed during the few seconds "setting time."

Shippers who pack exceptionally heavy merchandise in tape-sealed containers often seem to think that additional strips of gummed tape applied in various directions on the carton will reinforce it for maximum security of the contents. However, a tape-sealed carton can best be reinforced by applying the second strip directly on top of the first. In this way the bursting strength of the protective strip will actually be increased from 60 lb. to 120 pounds.

Twenty-five per cent additional protection is obtained when the overlaps of end strips are applied horizontally on the container and not vertically. Always use a good, sturdy carton. Be sure to pack the contents in it as neatly and snugly as possible. Apply a properly moistened strip of tape along the seam. Do not allow the ends to overlap more than 3 inches. Apply strips on all end seams. Again, do not allow ends to overlap more than 3 in. around the corners. Bend ends back around the corners and along the top edges in order to give maximum reinforcement.

Setting machines for required lengths

Preset, selective-measuring machines are offered by a few manufacturers to increase the sealing output for shippers who tape-seal "runs" of containers each having the same length and the same width. These machines can be set in advance for repeated feed of the long and short strips. However, once set for predetermined strips, intermediate lengths are possible only by resetting.

Many semi-automatic and fully automatic machines are equipped with measuring scales by which the packer can accurately determine the correct length of tape to dispense for the carton being sealed. Shippers should instruct their box maker (who as a rule will be glad to cooperate) to imprint their shipping containers with the required lengths for the short and long sealing strips.

Most containers require 6 strips of tape for proper sealing. This means 12 tape ends. Hit-or-miss methods usually waste about 3 in. of tape on each tape end amounting, on each box, to a full yard of needless tape which will not give additional security to the contents of the box.

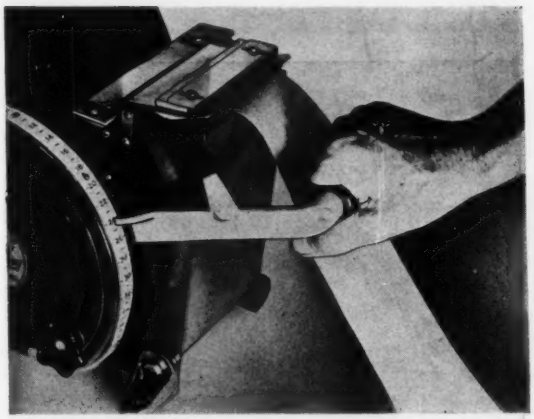
Today when kraft shortages are forcing many shippers to the use of salvaged or re-used containers, the selection of sealing tape machines equipped with automatic moistening controls is important to ensure optimum economy and efficient operation.

Shipment sealers for pressure-sensitive tape

Since Pearl Harbor many fibre shipping cases loaded with food and other materials have been sealed not with the familiar gummed tape, but with *pressure-sensitive* tapes having high water resistance. Some of these are

4—Selective length device on sealing tape machine insures shipper against waste by dispensing preset and visually measured lengths. 5—Measuring dispenser for pressure-sensitive tape may be set for two different lengths up to 12 inches. Photos, Better Packages, Inc.

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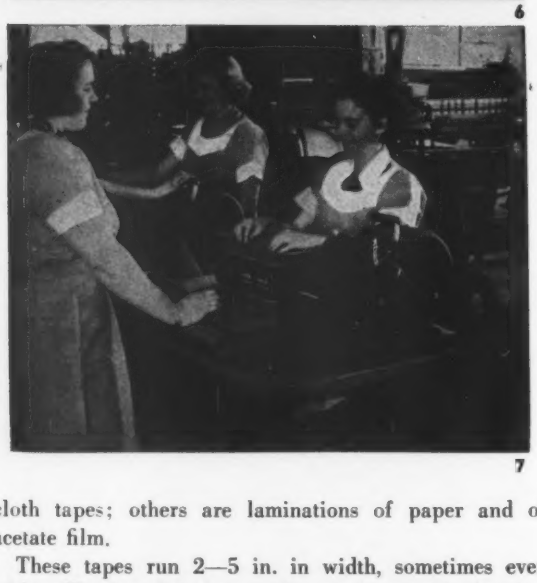


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8

6—A fully automatic tape-moistening machine which is equipped with a visual, positive-automatic moistening control. A pull of the lever will automatically measure, moisten and deliver the tape to the operator in the exact length which is required for the job at hand. Photo, Nashua Package Sealing Co. 7—An installation view of the tape dispensing equipment shown in the illustration above. 8—This dispenser performs a critical wartime job. Packages of important medical supplies are sealed with pressure-sensitive adhesive tape on a dispensing machine which has been specially constructed. Photo, Industrial Tape Corp.

cloth tapes; others are laminations of paper and of acetate film.

These tapes run 2—5 in. in width, sometimes even wider. The lineal inches used to seal a single shipping case run approximately 100—180 in. per box. *Square* inches of tape per box run 200—540 sq. inches.

If no measuring dispensers are used with this work, the tape wasted in application or damaged due to dropping or non-use of small end rolls is great. A waste of 20 per cent is hardly noticeable to the eye on the sealed containers because the waste is distributed over 6 separate strips of tape—or 12 tape ends. Another 10 per cent or 15 per cent is often wasted due to the operator's discarding of the tape roll before it is used up. For without a dispenser it is difficult to unwind tape near the core of the roll. These two factors, frequently result in a waste of possibly 30 per cent.

It is well to remember that if these pressure-sensitive tapes in wide, long strips are wasted, not pennies but dollars are being lost for this is expensive material. Five hundred and forty square inches of ordinary paper tape (60 lb. kraft) for sealing domestic shipments, cost only 1⅛ cents. However, the same quantity (540 sq. in.) of pressure-sensitive cloth tape costs over 25c, and if it is acetate tape, it costs 37½ cents. Accurate dispensers soon pay for themselves by avoiding waste.

Measuring dispensers for tapes in long lengths are now available. One of these is a carton sealer for tapes up to 3 in. in width which measures strips up to 36 in. in length. The measuring can be done with the visual scale on the side of the machine across which a pointer moves as the operating crank is pulled to feed tape from the supply roll. In most cases, each carton requires two pieces of tape of different lenghts; hence, this machine is made so that it can be set for any two desired lengths, and it will measure repeatedly either length as required. Though made to handle 3-in. widths, it is equally satisfactory for long lengths of tape as narrow as ¼ inch. It is able to cut cloth, paper, acetate or cellophane tapes.

Another carton sealer is a measuring dispenser for smaller boxes. It measures pressure-sensitive tapes in lengths up to 12 in. only, taking tapes of 1-, 2-, or 3-in. widths, whether these tapes are of cellophane, acetate, or paper. Although this mechanism is not generally intended to accommodate cloth tapes, special models are available for the purpose. These carton sealers for small boxes may (like the larger machines) be set to handle two desired lengths of tape (up to 12 in.) and will dispense either length as required, repeatedly. For other information concerning tapes and dispensers, see *Pressure-sensitive Tape*, p. 358 and *Tacky Tape Dispensers and Affixers*, p. 360.

Protective pads and cushions

When it comes to a selection of protective pads and cushions for the inner packing of a product, the engineer has a range of choice as wide as that offered to him in the field of outer shipping containers. The same general rules apply in the selection and design of interior packing protection as apply in the selection and design of the shipping container itself. A happy combination of the two factors is the aim of the engineer.

Simply stated, the material that will best perform the function of product protection at the lowest cost is the obvious material to employ. It is equally obvious that the matter of performance is first in importance while cost is the second consideration.

All types of interior packing pads and cushions, sheets and wraps have their logical place in the packaging picture. They range from the corrugated board air pads to the excelsior pad, from loose excelsior, wood wool and shredded tissue to softer paddings such as cotton, felt and, among more recent developments, crepe wadding.

Creped wadding has been adopted more and more as a staple product in the packing field. It has many natural advantages. It is soft, clean, flexible, cushiony, easily cut and handled, available in many convenient forms such as sheets, pads, rolls, in various thicknesses and with various backing materials. Because of its ready adaptability to the commonplace as well as to the unusual packing problem, it contributes to speeding up the operation of packing and cuts costs on many jobs where baser types of packing materials were formerly used. In effect, all packaging is the means of protecting products from some form of damage while in transit or storage on the way to or awaiting the time of use. The ultimate user has need of, and has become accustomed to, delivery of the products he buys in factory condition.

As products, new and old, are freshly packaged, new problems of protection arise. Almost all products need some interior protection other than a cleverly designed carton. Most carton designers recognize this fact, and today they keep themselves completely informed about all manner of accessory materials such as interior paddings, wraps and cushions of a protective nature.

Generally, the need of interior packing protection is due to the fragility of finish of the product. Finishes of all types—varnish, lacquer, enamel, porcelain—are used primarily to protect the product itself from wear, moisture, stain, chemical and physical changes. Some finishes provide beauty as well as protection to the product; others merely preserve this beauty and add nothing to its eye-appeal. Paradoxically, these protective finishes themselves need protection. That is the function of protective pads and cushions. The thickness and size of protective pads or cushions are determined by a number of considerations: the nature of the product, the weight, protection of finish or structure, the type of packing container, the nature of the journey, and the method in which handling or warehousing is done.

In some cases, the packing material is employed as a contact pad in conjunction with rigid interior packing for facing of corrugated pads or wood bracing members of wooden containers. In other cases, it is applied in sheet form to cover wide areas of finished surface as a cushion protection from direct contact with the walls of corrugated or fibre containers. In still others, particularly in the packing of small fragile articles, or in parcel post packing of liquids, it is employed in thick blankets to swathe the product completely in a resilient cushion which will provide full protection.

Used as a buffer between product finish and side or member of packing container, creped wadding provides the four essentials of a packing protection material:

1. Cushion to equalize the irregularities of the two opposing surfaces and eliminate press marking

1—A resilient cushion of three moisture-resistant pads protects x-ray tubes for shipment. All photos in this article, Kimberly-Clark Corp.

1



2—Flasks of saline solution travel overseas wrapped in 10-ply creped padding which resists moisture and slows absorption from any leaks.

2





3

3—*Aircraft parts, packed in shipping containers, are protected from shock and vibration by a punch-embossed padding with kraft backing.*



4

4—*Interior packing protection for a fragile cathode tube is furnished by a thick blanket of dimple-embossed padding which resists moisture.*

2. Reduction of surface "burning" through absorption within padding of vibration in transit
3. Surface smoothness which increases with pressure to reduce further hazard of "burning"
4. Conformability to surface, which prevents cinders or other gritty substances from becoming imbedded between finish and container walls

Not so many years ago, internal packing materials were given but little attention. They were considered necessary evils, avoided where possible.

The functions of interior protective packing design and materials used for the prevention of transit damage may be stated generally as:

1. Absorbing shocks transmitted to the product either from external blows received by the container or by concussion with each other when several products are packed in the container
2. Absorbing continuous vibration which all containers are subject to in transit and which would be transmitted directly, with damaging effect, to the finish of the packed product
3. Absorbing liquids from broken bottles or from leaking closures

Eye appeal in packaging naturally plays a most important role as a sales-display factor with certain consumer products of the luxury class—cosmetics, confectionery, candles are examples—products which vie with each other for consumer attention in dressed-up packages. Like all other important manufacturing operations, packaging of mass production items long ago progressed to the stage of engineering design and is now in the domain of the skilled technician. Because such packaging is a practical art, the factor of utility at all times governs the selection of materials employed.

In all packing design the engineer is governed by a great many considerations, including size, shape and weight of product, the construction and finish of the product, how many units must be packed in the container, cost allowance, handling, storage and transportation conditions, etc. Equally important as the type of container is the method of interior packing to be employed. Here again the engineer has a fairly wide choice, but the general divisions are simplified into the three methods discussed below.

Compression packing

Compression packing is used where the product is completely protected on one or more (in some cases all) surfaces with thick cushions of protective packing material. These hold the product in place, prevent contact with other products within the container, prevent its contact with the inside walls of the container, absorb shock and vibration in transit, handling, storage, prevent breakage and surface damage.

Suspension packing

A product is suspension packed when it is suspended by bolting or is otherwise anchored to one interior wall of the container so that it is free from contact with all other walls. In some cases, protective padding of appropriate thickness is located at emergency points of contact with braces or internal framing members of wood containers or other type containers.

Combination compression-suspension packing

A combination method is used when the product is protected on one or more or all surfaces by a thin sheet or wrap or protective padding, or when contact pads are placed on the braces or framing members to prevent direct contact of finish with the inner walls of the container so that rubbing and press-marking of finish is eliminated. For many such containers, the design favors lightness with strength, but the product packed is depended upon to supply a good portion of the rigidity of the package. The function of the protective packing material in such cases is to distribute so far as possible the weight of the contacting wall or brace or member over the greatest available area.

Flexible corrugated for protection

by Paul Thompson

Developed within the past few years, a new protective material which can be used for inner and for outer packing, has taken its place among major packing mediums. It is a paradoxical material—a corrugated paper which can be folded like uncorrugated paper. Related in type to single-face corrugated, it combines a smooth backing sheet with a corrugated facing. The paper used for the corrugations is generally 0.009 in. in thickness, while the backing sheets are of many types and weights.

The revolutionary feature distinguishing it from single-face corrugated is the construction of the corrugations. These are scored or indented across the top so that they are divided into many segments, a factor which permits them to be folded in any direction. While possessing the protective qualities of corrugated, flexible corrugated can be wrapped around any shape or object—whether round, cubical or cylindrical—with the same freedom as wrapping paper.

A wide range of uses

A comparatively new product, flexible corrugated is rapidly being utilized for an increasing number of purposes. One of its earliest functions was in the place of cartons or single-face corrugated and wrapping paper for parcel post and express. By combining the protective qualities of cushioning and an outer wrapping, it can be used in place of double wrappings of single-face corrugated and paper, saving both time and material. Since flexible corrugated can be folded in any direction, it proves particularly valuable in packaging the endless flow of sizes and shapes which passes over most packing benches. For wide packages, flexible corrugated can be used as it comes from the roll. For narrow packages, the roll width becomes the long dimension of the wrap. For even greater variety, it can be mounted in multiple widths on suitable compact dispensers.

Today, flexible corrugated has become an important material for production packing in manufacturing departments. Products as large as bomber wing-flaps, truck fenders and jumbo rolls of fabric are now being safely shipped to all parts of the world, completely packed in this material.

As a replacement for inner packing materials such as excelsior, shredded news and sawdust, flexible corrugated has the advantage of cleanliness and simplicity. The product cannot shift inside the wrapping, less bulk is required for safe protection. The wartime importance of reducing cube and weight in this way will operate as well in the economy of peacetime shippers.

Among the inherent advantages of flexible corrugated is the ability to multiply cushioning protection in wrapping operations. The package can be planned so that the multiple thicknesses developed in wrapping will give extra protection to vulnerable areas, with still further thicknesses or folds easily added when extreme protection is necessary.

For light fragile products such as glass coffee makers and radio tubes, a loose wrap of flexible corrugated has been found to provide an excellent floating inner cushion. Used in this way, the material takes the place of die-cut partitions, suspending the product inside the unit package or shipping container.

Flexible corrugated can be used on automatic wrapping machines. Handled in roll form, it can be wrapped with the customary machine operations to provide outer shipping containers.

To meet the needs of wartime packing for metal parts, new types of flexible corrugated have been developed which have corrugations of greaseproof, non-corrosive and acid-free paper, with a backing of creped kraft or 30-30-30 waterproof paper. For overseas shipment, this is

1—Flexible corrugated is important for production packing by manufacturers. Here rolls of fabric are factory-wrapped for storage or shipment. 2—Multiple-unit overhead cutter is used for dispensing flexible corrugated. All photos in this article, Sherman Paper Products Corp.

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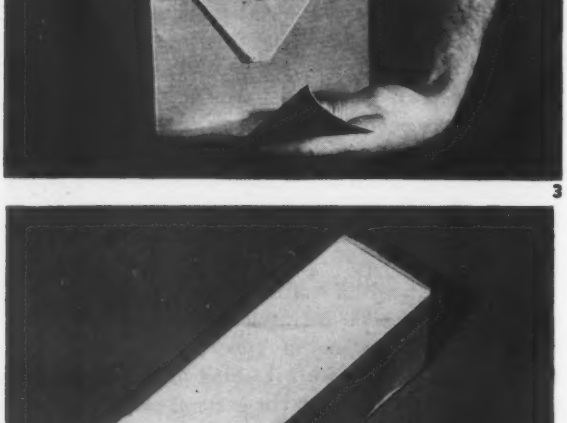


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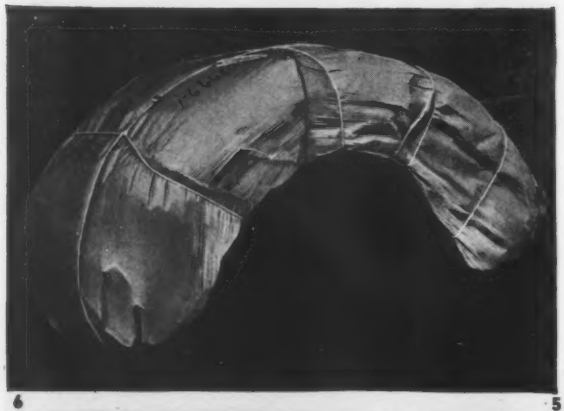




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employed only as inner packing, but it may be used for outer packing on domestic shipments.

Types of flexible corrugated

The most widely used type of flexible corrugated has kraft backing which varies in weight to meet different requirements. It ranges from the light 35-lb. weight to the extra-heavy board types 0.016 inch in thickness, and the multiple, reinforced types. Other varieties include the greaseproof, non-corrosive types; one with creped backing used primarily for inner packing; and the waterproof 30-30-30.

Most shippers find the roll dispensers best for general use. These can be had to meet different requirements for use under, over, or on the bench, and come in single- or multiple-roll widths. Where production requirements call for the packing of large quantities or uniform sizes, flexible corrugated packing material is specified in sheets or in die-cut shapes.

Flexible corrugated may be sealed with gummed or pressure sealing tape, tied with twine, stapled, made into envelopes or bags for production packing.

Expanding postwar uses

There are few fields where flexible corrugated is not now used in some way. During the war, the greatest attention has been focused upon its use to save time, materials, weight and space. After the war, the emphasis will logically shift to its use in reducing cost. The increasing use of high-cost air express has thrown the spotlight on the savings in weight. Since, unlike cartons or boxes, it is not limited to predetermined sizes, it is more versatile for general shipping use, effecting over-all reductions in size and weight of shipment. As manufacturers employ flexible corrugated, they find an increasing range of uses for it as a complete packing material or as an auxiliary material to be used in conjunction with inner packages or shipping containers.

The versatility of flexible corrugated is illustrated by these typical applications. 3—It may be folded, thus, for hand or machine packing. 4—As an inner pack for delicate radio tubes, it furnishes a loose, springy wrap, provides a floating cushion. 5—For freight shipments of heavy objects, such as truck fenders, it is an approved replacement for bulky crates. 6—A greaseproof, non-corrosive type of flexible corrugated protects machined teeth of a gear ring. 7—This material may be wrapped around odd-shaped objects to make a close fit and cushion.

7



Marking shipments

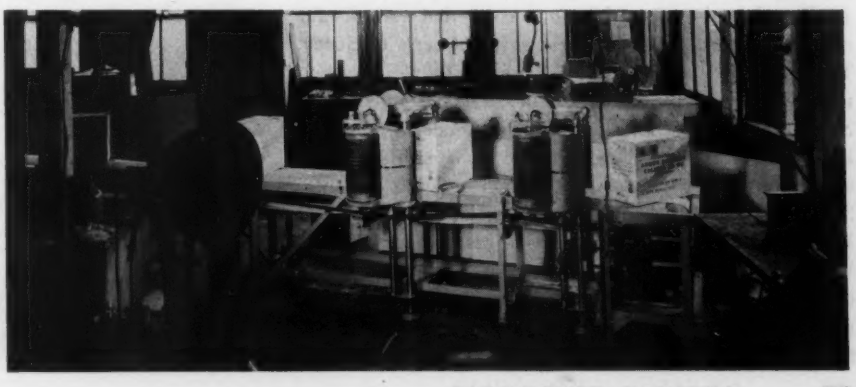
by William A. Force and J. R. Swift

In 1926, a letter concisely addressed "God" was mailed to Rome from Liptau, Germany. It was returned to sender marked "Address Unknown." This, admittedly, was a situation which even the proper packaging and marking could not remedy, but we quote it as an example of the exception which proves the rule; namely, that communications and packages properly marked should reach their destination if it is confined to our global sphere.

The history of marking methods goes back to biblical times, but labor-saving marking equipment of a speed-up nature has tended to lag behind the machines that produce goods. This was only natural, as the horse must come before the cart, and machines had first to be invented and perfected before fast production aids were possible or necessary. However, man was slow to realize how much the proper marking of materials and parts would facilitate the processing, fabricating, assembly, and shipping of products, and how much it would lower the labor costs. Now, marking equipment is an integral part of production, from the starting point of raw materials through every stage of production. Goods that are not well and adequately packaged and marked cannot be quickly comprehended and transported. The enormity of supply problems in wartime is very obvious, and the vital importance of proper packaging and marking of shipments is equally so. Speed and efficiency on the home front also are imperative to maintain production and shipment schedules.

Supplies for our armies and those for the home front must be procured from countless different sources located in widely scattered areas. They must be carried by every means of transportation, from the mule to the airplane. They must be assembled and reshipped, handled a dozen times en route. Thus, the problem of integration is paramount. These supplies must reach their destination. They must do so on time, on schedule. They must be securely packaged and their contents clearly and correctly indicated. This essential need seems transparently clear, but wartime conditions make unusual complications. Lack of experienced freight handlers, shipments received in foreign lands and handled by natives all add to the confusion. The government procurement regulation has helped to coordinate processes of shipping and has unified the procedures of the different services regarding a few basic principles. The first requisite, obviously, is correct packaging. Then follows correct marking. The "each to his own taste" method of marking shipments could produce only confusion. Officers of the armed forces found that markings were frequently too large or too small, carelessly done, often containing much unnecessary data. The result was great difficulty, frequently under perilous conditions, in finding the necessary information, and with insufficient space left for subsequent military markings. Due to the tremendous problem of supplies in this war, the armed forces hit upon the idea of designating the destination of shipments by procedure: i.e. by quickly recognizable code markings. Unification of the main elements necessary to successful shipping of all supplies was the first step to bring order out of the confusion. The prime essential markings are weight, cubic contents, service code when required, and sufficient space for the code address. The control data and domestic address of the shipper, as well as the consignee's name and address must, of course, be included, but must not occupy too much space. In order to facilitate stowage on shipboard and save precious space, the means of packaging, the weight and cubage are extremely important and above all, the code address must be foolproof. These are called permanent marks and are all to appear on one of the principle surfaces of the container. They should be stenciled or printed, the size to be in proportion to the size of the package. Generally, the weight, cubage and contents are to be indicated in the upper two-thirds of this surface, while the lower one-third is reserved for the overseas address. This is placed on the container by the contractor, or subsequently by the Army depot. The less vital markings, such as the domestic address and contract data should be placed on other panels of the container. On shipments totaling less than a carload, the name and address of both consignor and consignee may be placed on one or two surfaces of the container in an area not to exceed 28

1



1—Here marking is done on a conveyor line. Such units as these can print full shipping and other necessary descriptive markings on quantity runs of cases. Photo, Superior Type Co.



2



3

inches. Contract data markings, consisting of purchase order number, contractor's name, item number, lot number, date inspected, etc. are limited to a maximum area of 42 sq. in. and should be placed preferably on the same surface as the domestic address label. The Transportation Corps, which has evolved easily understood shipping and marking instructions, emphatically stresses the point that by far the most important single mark on the packaging container is the overseas address. In order to give this the necessary prominence, one can use the largest size stencil consistent with the size of the container.

Fundamentally, the principles underlying the marking system are comparable to the requirements of the Postal Department in its standardized requirements regarding the rules of marking on matter that goes via the mails. Standardization is necessary for peak efficiency. The marking system allows for necessary variations to meet different requirements, but the same basic principles apply to all. As an indication of the success of this system, before it was adopted departures from correct practice on shipments going overseas ran as high as 7000 a month. Shipments were marked in a manner fancy-free, with all kinds of marking agents, in letters of assorted sizes. Priceless time was lost making corrections. Industry's cooperation with procurement officers has considerably reduced the number of incorrectly marked shipments, but there still is room for improvement. With the complete specifications of the Army's technical services, plus the proper marking equipment, errors should be minimized.

The lessons learned in wartime, often painfully, should not be forgotten in peacetime, but carried over into normal work. The expediting which the emergency of war engenders should not be discarded, but should be made an accepted form of operation. We have found that standardization of marking has been of very great help in speeding packages on their way, preventing misdirection of shipments, as well as enabling everyone from the most experienced to the most inexperienced handler to do his job more efficiently. Standardizing the position of different types of markings saves time by enabling the handler always to look in one spot when examining shipments preparatory to sorting or when looking for specific items. The use of certain relative sizes of characters for definite types of markings immediately stresses more important information. Sequence used in code or pattern of marks speeds understanding because the handler knows exactly where to look for the information he seeks. A repetitive pattern is the quickest way of flashing information.

Similarly, this overall standardization enables green handlers to learn more rapidly, because it fixes the habit pattern, and condenses the learning period into a shorter space of time. The use of colors as a supplementary identification allows illiterates to do some of the sorting work previously reserved for experienced and intelligent workers. The use of serial numbering enables the checkers to sort in proper sequence, as well as to identify packages which have been misplaced and how many have been misplaced. This helps to correct errors, in addition to controlling the handling of a shipment. The practice of including in the numbering code the total number of packages in the shipment, plus the package number, for example (as, No. 21 of 48) is a practice found to be very helpful. Serial numbering is the peak of efficiency because it enables the fullest control possible to be used.

With the packaging and packing of many new and widely divergent items, plus inexperienced help to do the

2—This is how the fountain stencil brush is used with a flat brass stencil for marking an address on a wooden case. Photo, Superior Type Co. 3—Printing roll used for rapid marking of address and other information on cases. Automatic re-inking rolls are attached. Photo, Superior Type Co. 4—Rocker stamp with auxiliary ink pad. At bottom are insert logotype dies for changes. Photo, Adolph Gottscho, Inc.

4



work, new problems of procedure have constantly to be dealt with. Containers are hard to get and must frequently be re-used, adding to the difficulties. These difficulties are shared by everyone all along the line. Therefore, the shipper must not only ensure against errors in his own plant but he must also prepare shipments to undergo many hazards. This situation demands a thorough knowledge of the required procedures, and specific application to the problem of packaging and marking merchandise.

The actual equipment used for marking shipments varies not only with the shipment but with the desires of the shipper regarding speed, accuracy and whether overall economy is more to be desired than initial cost. But regardless of how the job of marking is done, if the address is not clear, the shipment may be lost in transit. Therefore, regardless of the method or equipment, it is advisable to use only first grade equipment and material and to take care that they are used in the manner prescribed.

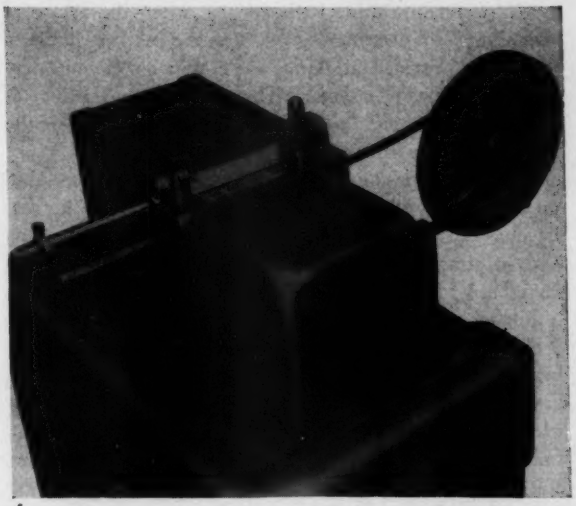
Stencils are not expensive equipment and when made of brass have the added advantage of being extremely durable as well as simple to operate. For quality marking of shipments, the stencil method has obvious advantages in both legibility and uniformity. Once the stencil has been checked as being correct, all packages marked with it will be correct as far as the reading matter is concerned. Of course, legibility requires care in handling the stencil and in applying the ink. But here, the personal desires of the shipper enter in. Most people find the ink in cake form the easiest to use with stencils, but there is a definite trend to the liquid type ink, which can be used with the regular brush or in the fountain type brush. A recent development for use with thin stencils is the felt roller.

The durable brass stencil requires the use of special tools for cutting and, therefore, must be purchased from the stencil maker. The less durable board stencil is adequate for many stencils and can be cut in your own shipping room by machines available. Machines are limited to straight line stencils, with characters ranging in sizes from ½ in. to 1¾ inches. When special designs, export insignia or other variations are required, the hand-cut stencil is necessary. For use with the felt rollers, the lightweight cellulose acetate stencil has given good satisfaction.

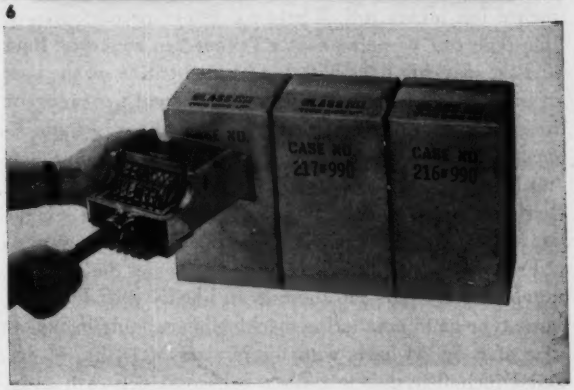
5—Fountain pen marking unit which is used for one-of-a-kind address marking. Inks for these units are obtainable in six colors. Photo, Floquil Products, Inc. 6—Embossing machine for permanent metal shipping tags. There is a slide arrangement for quick changes. Photo, James H. Matthews & Co. 7—Automatic hand case numberer used for serial and code numbering for control. Photo, William A. Force & Co.

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7

When using stencils with the brushes, more care must be exercised today as the bristles are not of the same high quality formerly available. In normal times, all brushes, whether regular stencil brushes or fountain stencil brushes, were made with Chinese bristles which are superior for this hard usage. Due to the war, these bristles are practically unobtainable. Therefore, it is extremely necessary that the brush tip be cleaned in order to prevent any ink build-up on the bristle. It is equally important that the proper method of application be used. This consists of a rotary motion in stenciling with a reasonably light pressure. Too much pressure or "daubing" is likely to fan the bristles out and render the brush useless.

In some instances, particularly where the shipment is "one of a kind," crayons or marking pencils are the most economical to use. Marking crayons are available in various qualities for application to materials such as lumber, smooth wood and glass, or for general purpose application. These are similarly available in a variety of colors.

The marking pencils using ink are similar to a fountain pen, with a large reservoir for special ink. The heavy duty units generally take the usual fluid stencil ink, while the lighter units are available with a special quick-drying ink, obtainable in six colors. (*Continued on next page*)

Of particular interest these days, when the re-use of containers is a necessity, is the "salvage ink" available to obliterate previous markings on crates, corrugated containers and wooden boxes. The quick-drying variety is applied with a handy roller, and, it is claimed, covers the old markings with one coat.

In order to speed up the application of marking to large quantities of packages, especially when the marking can be done on a conveyor line, rubber dies, rocker stamps and printing rolls with and without changeable inserts have been found extremely helpful.

Rocker stamps and printing rolls, where they can be used, are among the fastest means of marking. They also increase the legibility and uniformity. The rocker stamps are inked with an auxiliary type pad, using special inks which are available for practically any surface in a great variety of colors. The roller type units which are generally limited to size, do their own inking through an attached felt inking roll. Where conditions permit, units of this type can be permanently fastened to conveyor lines and the marking done with but little attention on the part of an operator. Another recent development for conveyor line marking is a self-contained solenoid operated attachment, which is adaptable for small area printing dies, dating type or code numbers. These conveyor units put the marks on the shipments with little or no attention, except for setting and an occasional re-inking of the inking rolls.

Frequently, shipments require that cases be serially numbered. For this job there is an ideally suited unit. A large type hand numbering machine is available in capacities of 6 or 7 wheels with figure sizes of ½ in., ¾ in. and 1 inch. The unit is entirely self-contained with automatic advancing mechanism for the wheels, as well as an ink pad which re-inks the figures after each impression. Similarly, there is a conveyor numbering attachment for the longer standardized run.

Use of numbers for the control of shipments is increasing rapidly, as it enables the shipper to identify each and every item, to trace lost items more rapidly and, with proper record keeping, to identify each operator's job.

When extreme durability is required, or when items are shipped loose and do not have any adequate place on which to stencil the address or markings, tags are frequently attached. For export shipment of metals and machines, these tags are frequently of metal and are either indented or embossed, depending upon the degree of legibility and non-counterfeitability required. There is a variety of machines for producing these tags. Some put the marking on the tag one character at a time, while the fastest make complete tags at each pull of the lever. The quantity requirement of the shipper generally determines which type of equipment best suits his needs.

While not adapted to all products, nor in universal use, occasionally hot branding of wood cases is used. One advantage is its extreme durability, but it does not have the versatility of some of the other methods mentioned. When the durability of the mark is paramount, a special protective wax designed by one of the wax companies can be used as a protective coating applied to the outer surface.

The foregoing is by no means a complete review of the many devices, materials and equipment available for the marking of shipments, but outlines the more popular equipment available. Probably many of you have found it necessary in these uncertain times to investigate your shipping problems, especially with the more stringent government requirements frequently obsoleting older methods of marking. The lessons being learned today and the equipment being developed will be extremely helpful in putting postwar shipping departments on a more efficient basis. With increased mechanization, we feel quite sure that better and faster marking implements will become available as the need arises. Obviously, this all-productive effort is of no avail unless the shipment arrives at its final destination in usable condition. Therefore, we should all follow the two essential rules for shipping: (1) package it correctly, (2) mark it right.

8—This machine cuts the board address stencil. Marks made by such stencils are shown on cases at left. Photo, Marsh Stencil Machine Co.

8



9—Re-use of containers is important. Here a "salvage" paint has been employed and a stencil is used over it. Photo, Floquil Products, Inc.

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Shipment of freight by air

by J. D. Malcolmson

Air freight growth furnishes another emphatic reminder of the tremendous acceleration that war can contribute to a new, and ordinarily slow, development. Prior to December, 1941, the amount of freight carried by air was negligible—indeed most people thought passengers and air mail were the only sources of air line revenue. Thus only 22 tons of express and freight were carried by air in 1927, and this figure gradually moved up to 11,000 tons for the year 1941. But now see what the war did: by the autumn of 1943, the Army Air Transport Command alone was flying cargo at the rate of over 35,000 tons per annum, and this figure was about equalled by the combined tonnage handled by the 20 domestic air lines in the same year. In addition to that, the Naval Air Transport Service was carrying an undisclosed amount of freight which undoubtedly approached these figures. To this total must be added the rest of the Western Hemisphere, and this is no small addition inasmuch as South America has always shipped more freight by air than has the United States.

This wartime acceleration in air freight bids fair to continue into the postwar period. For example in 1941, the peak year of automobile production, we produced $3,700,000,000 worth of automobiles, but in 1943 the OWI states that we planned to spend 5.4 times that amount for aircraft—the colossal total of $20,000,000,000 or almost 1/7 of our total estimated national income. The weight of aircraft produced in 1944 was increased by a very large percentage, and we can look for further developments. Even more significant is the following statement, issued by the Office of War Information in the early days of the war: "More than one-fourth of all twin-engined and 4-engineed aircraft manufactured in 1943 will be transports, and if all the cargo planes expected to be delivered to the armed services in 1943 could be imagined as assembled in a single area, and all taking off simultaneously for the same overseas destination, each of them carrying fuel for a 2,000-mile flight, they could have on board a total of over 20,000 tons of cargo."

Most of these transports will be adaptable to postwar domestic freight carrying. We do not even need to consider converted bombers, because converting them is too much like trying to make an armored bank truck into a highway carrier. In these calculations, we have not even considered the possibility of gliders, helicopters and dirigibles. Probably American industry will show its usual aversion to adapting secondhand equipment, so that it would not be surprising to see an entire new cargo plane. Such a plane will probably have large end-opening doors or hinged sections to permit fast and direct loading.

The present methods of loading cargo into planes have certainly indicated the urgent need for changes in design. In the past, most of this cargo has been stowed in odd-shaped compartments in the front and rear ends of the regular passenger plane. Occasionally cargo is also stowed in the seats and fastened into place, and, of course, on such trips no passengers are carried. In the fall of 1943, several of the leading air lines installed a regular cargo service, but here again an ordinary passenger plane was used after removing the seats and all interior trim. Floors were reinforced and special webbing was provided to hold the cargo in place. The results, however, were still far from ideal inasmuch as the cargo had to be passed by hand through three different levels to reach the front door, and the effect was more like a bucket brigade than a modern materials-handling operation. In fact, many of these people are already planning some day to form the "Ancient Order of Former Package Passers." Essentially this form of loading is only a little different from that illustrated by a 1919 photograph of a four-engined Handley-Page ex-bomber being loaded with freight.

These present methods of loading and stowing cargo make it essential that shippers check very carefully with



1—Easter lillies from Bermuda, rare flowers from Latin America, were prewar air cargo. They will return as postwar air freight, together with many more essential items new to this method of transportation. Here a corrugated carton gives protection and is light in weight. Current research will provide better preservative wrappings. Photo, Pan American Airways.

the air express agency or the air line to make sure that their packages will be of such a size as to get through the doorway and into compartments.

The fact that so much handling is necessary militates against the use of wooden boxes with their nails and splinters, and even makes the use of metal straps undesirable—in fact, many air lines prohibit the use of metal straps both for the above reason and because of the fact that these straps may injure adjacent cargo or even the interior of the plane. Photographs which illustrate the loading of cargo planes have indicated that both shippers and air lines instinctively realize that corrugated or solid-fibre containers are much easier to handle. However, the real reasons the corrugated box is ideal for air freight are its light weight, its relatively low cost, its rigidity, insulation value and resistance to impact—all properties that meet the requirements of the ideal container for this purpose. These properties are even recognizd by the Army, which is naturally more interested in performance than in cost. On page 199 of the *Army-Navy General Specification for Packaging for Overseas Shipment* (U. S. Army Spec. 100-14a; U. S. Navy Spec. 39P16a), the following remarks appear under "Air Transportation":

> The following factors must be considered in determining specifications for shipping containers for air shipments:
>
> Lightness
> Strength
> Dimension Limits
> Weather Resistance
>
> In selecting the type of container, the fibreboard box, weather resistant, reinforced, if necessary, should be used whenever the weight and nature of contents permit. Air shipments are generally hand-loaded; for this reason the size of the package should be kept as small as possible and as light as possible to permit handling by one or more persons.

Another testimonial comes from Treasure Island in San Francisco Bay which is now really living up to its name. Treasure Island has been converted into an airport from which transpacific planes take off. Trade-journal articles have stated that a crew of expert packaging engineers is stationed there to reduce the package weights without endangering contents. These men examine all incoming shipments, and wherever possible substitute lightweight paperboard containers for the previous weight- and space-consuming wooden boxes and crates. During the month of June, 1943, alone, a total of 27,453 lb. was saved by this repackaging. That saving is the equivalent of nine clipper cargo loads, and during the past several months the total weight of air shipments has thus been cut by 29 per cent. Division Traffic Manager V. A. Kropff quickly realized that many incoming shipments had been packed for protection against rail and steamship rough handling far in excess of air transport requirements. Probably the most striking conversion job involved a delicate electrical device weighing less than 1 oz.: it arrived in a wooden case weighing 7 lb., was repacked in cotton in a paperboard box about the size of a package of cigarettes, and arrived at its destination in perfect condition. Since this technique has been adopted, it is stated that no shipment has been damaged or lost on these Pacific air cargo operations due to the container, a fact all the more remarkable since the repackaging job is done under high pressure.

Container regulations for air cargo

The specific rule for packaging air freight will be found in Item 6, Sec. 1 of the Air Express Division Tariff No. 7 of the Railway Express Agency, and it reads simply: "All property shall be so prepared or packed as to insure safe transportation with ordinary care and handling." Also par. 4c of Sec. 1 states that the Express Company "shall not be liable for loss, damage or delay caused by improper or insufficient packing or securing." This would seem to indicate that there are no definite container specifications. In discussing this point with officials of the Railway Express Agency, they agreed that if a package could be delivered to the plane by hand, the specifications need only comply with the above quotation. They point out, however, that most express packages are handled by rail express either before or after the plane flight, and in that case the movement over the rails must conform with Rules 18 and 19 of the Official Express Classification. Rule 19 describes wooden boxes and crates, while Rule 18 describes in detail the construction, sealing and other requirements for corrugated and solid-fibre containers. We were also advised by the Express Agency that in its opinion this rule, or something similar, will continue to apply to the expected increase in postwar air freight even though this freight may not all come under the definition of express. The Railway Express Agency is now handling all the express shipments over American air lines, may be expected to continue its good work after the war.

It is manifestly highly desirable that all the air lines operate under a uniform set of specifications when describing acceptable fibreboard containers. Such a uniform specification has worked out very well for rail freight. There, the first rule describing these containers appeared on July 1, 1906, and has been kept, with amendments, in the freight classification ever since. Today it is known as Rule 41, and about 1,000 domestic railroads and steamship lines operate under it. Rule 18 of the Express Classification is essentially the same as Rule 41, except that the Freight Classification permits larger containers, and also permits most packages weighing under 35 lb. to be "securely wrapped" instead of requiring a box. As a result, today all shippers by freight and express know exactly how their merchandise is to be boxed.

Unfortunately the motor truck industry has never been able to agree upon a similar uniform set of specifications, so that today each truck line decides for itself what type of containers it will accept—and the results in many instances have not been very gratifying. It would, therefore seem that the present is an excellent time for all the air lines to assure the continuation of a uniform packaging specification to avoid trouble later.

We believe that most shippers, box makers and air line traffic men feel that Express Rule 18 is about as good as anything that could be devised at this time to describe paperboard containers for air shipments. Even if this rule is not perfect, it certainly provides a taking-off point.

The Air Express Division of Railway Express Agency

admits that it cannot set up a rigid schedule of maximum package dimensions due to the different makes of planes in service, but as a rough rule they recommend the following maximum dimensions: length 49½ in., width 44 in., depth 18½ in. Packages of unusual shape and size should be checked with the local express agent. For instance, exceptionally long, slim packages can often be "threaded" through the side door.

Density is another factor which should be considered. Most air liners can handle 40 lb. per sq. ft. of floor space, while some go up to 100 lb., though the latter figure would only involve commodities of extra-high density. For example, a relatively small box with a base of 37 in. by 16 in. occupies a floor space of 432 sq. in. or 3 square feet. This box could carry 300 lb. without exceeding the 100-lb. limit. Sometimes even heavier shipments are taken by attaching boards to the bottom of the package to increase the area of the package in contact with the floor.

What can be shipped by air?

In general, air express will take almost anything that is acceptable by rail. Forbidden articles include explosives, inflammables and acids (unless special permission has been secured, radium, radioactive or magnetic materials (unless specially packaged and located in the plane), motion picture film (unless specially packed) and most live animals. It is interesting to note, however, that certain "inoffensive, non-odorous" animals will be acceptable "when securely packed." If you are interested, this list includes horned toads, newts, salamanders and chameleons.

Shippers should also bear in mind the effects of low temperature and reduced pressure in case the plane might have to climb to high altitudes. Cut flowers, fresh vegetables and certain liquids might then be in danger of freezing unless properly protected. Corrugated board, especially in multi-thickness, is an excellent insulation against sudden temperature changes. Low pressures may start leaks in some containers. Therefore, such packages as friction-top cans containing chemicals or liquids are especially vulnerable to high altitudes, and warrant consultation before shipping.

During war times, of course, expense is a secondary consideration and all manner of heavy merchandise is then shipped by air in order to keep critical manufacturing operations from risking a shutdown. In normal times, however, speed and valuation are the chief factors in determining when to ship by air. There are many times when it is necessary to rush a shipment—perhaps to meet some specific market such as a special holiday sale—to arrive with the goods in the highest salable condition. Other examples might be out-of-season fruits and vegetables, cut flowers, fashion styles, broadcast transcriptions, motion picture films, newspapers and magazines, and other items where the time limit is important. Valuable merchandise such as jewelry and furs often justifies air freight, and of course with every small reduction in the rates, the volume will show great increases.

In the future we will probably see enormous increase in the shipment of perishables by air freight. For example, fresh fruit and vegetables, especially when out of season, will undoubtedly move from the west and the south to the east with the same planes taking fresh fish from the seaboard to the middle west. All this means that considerable thought must be given to the weight and nature of the container itself. The war has developed many strikingly new container materials. So-called weatherproof or V-board corrugated and solid-fibre boxes are lighter than wood, yet will withstand prolonged contact with water without disintegrating. New wax treatments have resulted in paperboard packages that are already being successfully used for carrying fresh fish surrounded with water ice in place of the former tin boxes. Other familiar examples of this newer development are the Ration K boxes, the various dehydrated food packages, the small arms ammunition container, cylindrical paper shell tubes and many other lightweight paperboard packages developed under the high pressure of military requirements to reduce weight and substitute for critical wood and metal.

Dehydrated foods are certainly here to stay. Because of their light weight and concentrated valuation, they form an excellent cargo for plane transportation. This is especially true because of the enormous reduction in cargo space that has been effected by dehydration and then further reduced by compression into tablets. In general, dehydration alone saves 75—90 per cent in weight and 50—90 per cent in space. When the dehydrated product is further compressed into tablets, an additional saving of about 50 per cent is effected.

Cost of air freight

Of course, the real factor which will always keep the preponderance of freight on the rails is the unavoidably high cost of air freight. It should not be necessary to analyze here the reasons for these high rates as they are self-evident. They will, of course, come down in the future, but their levels must always stay high as compared with rail traffic. Thus at present it actually costs more to ship 100 lb. of express by air than 100 lb. of passenger, due to the extra expenses incurred before take-off and after landing. In general, air freight runs about 80c per ton-mile, but an advertisement run by a plane manufacturer in the *Saturday Evening Post* for September 18, 1943, carried the headline: "Prediction:—Postwar freight will fly at less than 15c a ton-mile." By contrast rail freight is traveling at slightly less than 1c per ton-mile.

Statistics quoted above need inspire no fear that railroads will lose any appreciable freight business to the airplane. Thus the 1942 movement of 20,000 tons of air express if multiplied by 100 would still be only 0.1 per cent of the freight ton-miles now carried annually by American railroads. In this connection, it is also interesting to note that for the five years 1935-1940, the average income of U. S. air lines was made up 95 per cent from passenger and mail and only 3 per cent from express and freight. Instead, the air cargoes of the future will probably be items such as perishables where speed is worth the extra cost. In the words of Mr. Tom Girdler, speaking over the radio in October, 1943: "Goods shipped by air are goods which otherwise might not have been shipped at all."

Packing for export

by J. D. Malcolmson

Space-saving in wartime packing for export has, of course, been an absolute essential, and it is to be expected that many of the lessons thus learned will last. However, since the packing of each item presented its own problem, it is impossible for us to attempt a thorough coverage here. We will, therefore, merely touch on some of the outstanding points and direct the reader to sources of more detailed information. These sources will be found in the bibliography at the end of this article. Particular attention is called to Chapter J of the Bonnell manual which includes 40 pages of very valuable and concise information on this subject.

In considering packaging for domestic shipment the problem is somewhat simplified by the existence of the uniform packing requirements itemized in the Consolidated Freight Classification which applies uniformly to all of the railroads, many of the coastwise steamship lines and many of the motor carriers. Unfortunately this condition does not exist for trans-oceanic shipments, as not even the efforts of the North Atlantic Conference have succeeded in developing uniform packing methods.

Export shipments during normal times

It is a sad but well-known commentary on American industry that we have paid a great deal less attention to export packaging methods than most of our foreign competitors. This is undoubtedly due to the fact that the average American manufacturer had enough domestic business to keep him interested, and his export shipments, if any, were left more or less to chance.

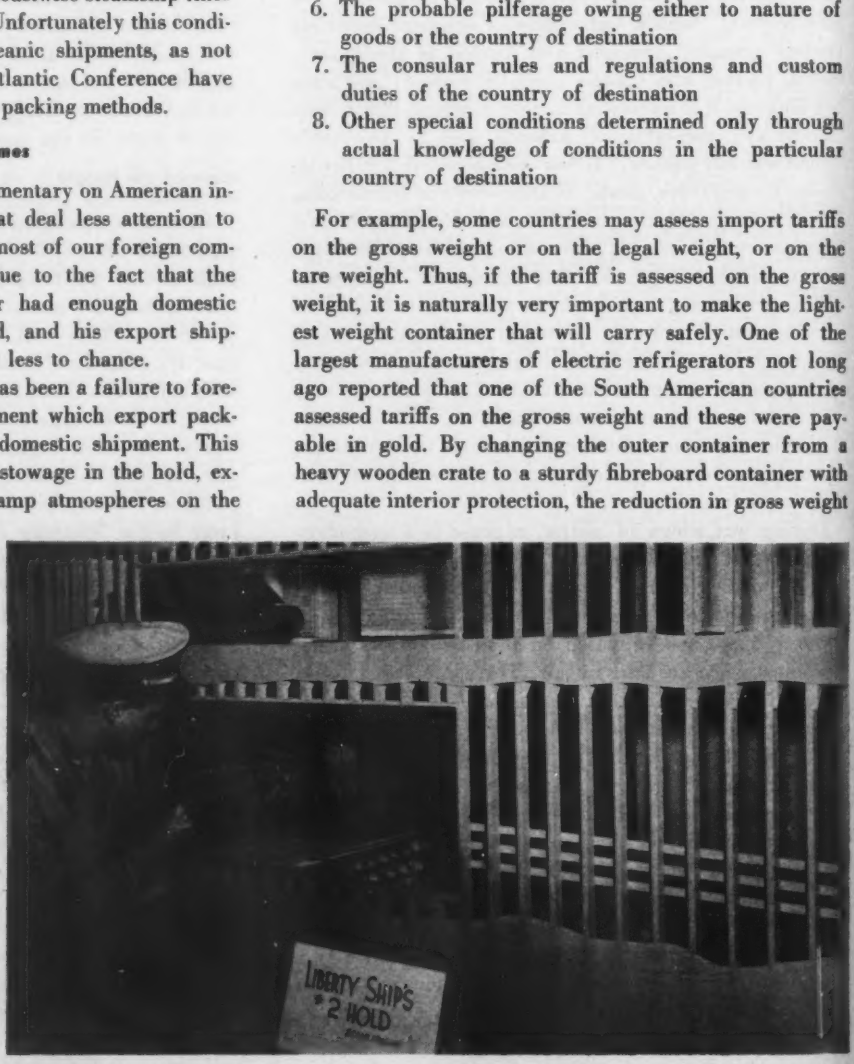
Our chief trouble in the past has been a failure to foresee the much more severe treatment which export packages receive as compared with domestic shipment. This includes loading onto the ship, stowage in the hold, exposure to shifting cargo and damp atmospheres on the voyage, unloading of the ship—in many cases by unskilled labor perhaps with lighters—and, finally, transportation to destination by every conceivable means.

Still another hazard is the amazing ingenuity shown by natives of many foreign countries in pilfering part of the contents without leaving any evidence on the outer container. The U. S. Department of Commerce has suggested that the following points be kept in mind:

1. The nature and value of the article
2. The unloading facilities at destination
3. The inland transportation system in the country of destination
4. The climatic conditions en route and in the country of destination
5. The amount and nature of trans-shipping that may be required en route to the final port
6. The probable pilferage owing either to nature of goods or the country of destination
7. The consular rules and regulations and custom duties of the country of destination
8. Other special conditions determined only through actual knowledge of conditions in the particular country of destination

For example, some countries may assess import tariffs on the gross weight or on the legal weight, or on the tare weight. Thus, if the tariff is assessed on the gross weight, it is naturally very important to make the lightest weight container that will carry safely. One of the largest manufacturers of electric refrigerators not long ago reported that one of the South American countries assessed tariffs on the gross weight and these were payable in gold. By changing the outer container from a heavy wooden crate to a sturdy fibreboard container with adequate interior protection, the reduction in gross weight

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1—Palletizing, a practice in which containers are standardized to fit freight car or ship hold, has effected great savings in warehousing and shipping for the Navy during the war. It may revolutionize postwar shipping. The scale model shown in this illustration reveals how compact palletized units may be easily loaded into the hold of a Liberty ship. Photo, U.S. Navy.

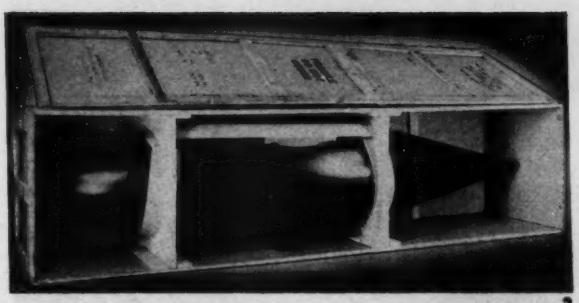
effected a savings of $10 per refrigerator in custom duties. It should also be borne in mind that ocean-freight rates are calculated not only on the weight but also on the cubic space occupied, so that it is very important to knock down merchandise to the greatest possible extent.

The proper marking of export packages does not sound complicated, but many shippers fall down on this point more through ignorance than carelessness. Your insurance company, or even the American Consular representative, can usually offer good advice, and on page 234 of *Bonnell's Manual* there is a table showing most of the common caution markings such as "This Side Up" translated into Spanish, French, German and Portuguese. Many foreign countries also require the gross, tare and net weights to be shown in metric figures. A valuable booklet in this connection is the *Units of Customary and Metric Measure* issued by the Department of Commerce as Publication No. M 121. These tables will save an enormous amount of figuring.

Export shipments during war times

War times always accelerate technological developments and shipping methods are no exception. During World War I the Forest Products Laboratory at Madison, Wis., made some almost unbelievable savings possible in cargo space and tare weights in the overseas shipment of artillery wheels and nearly every other commodity required by the Ordnance Department. Naturally much of this development endured through application to peacetime shipments, and of course the 20 years between the wars have also shown great improvements in export packaging. It is quite evident, however, that we still have a long way to go before we reach the ultimate in such developments, and this present war has already started to accelerate our knowledge of shipping methods. As a matter of fact, the problems this time are probably 100 times greater than in the past war due to the fact that in this war it is necessary to ship equipment all over the world under every form of transportation including shipment in cargo planes.

For example, certain Army clothing which was formerly packed in fibre and wooden cases was later compression baled with a space saving of 35 per cent. Shovels which were formerly shipped in wooden crates are now being simply strapped together with wire saving 20 per cent in space. A field range stove for the Army which was formerly shipped in a double crate was subsequently being shipped in a newly designed single crate saving seven per cent in space. Army garbage cans formerly shipped separately in individual crates are now nested together in a lighter crate adequate for six cans with a space saving of 60 per cent. Army shoes which were formerly packed in individual cartons are now being bulk packed with a saving of 25 per cent. Machine guns formerly shipped one to a box are now shipped two to a box with a space saving of 35 per cent. This list could be extended indefinitely but it simply illustrates the urgent need of conserving every possible cubic inch of cargo space in order to offset the delays due to shipping all over the world.



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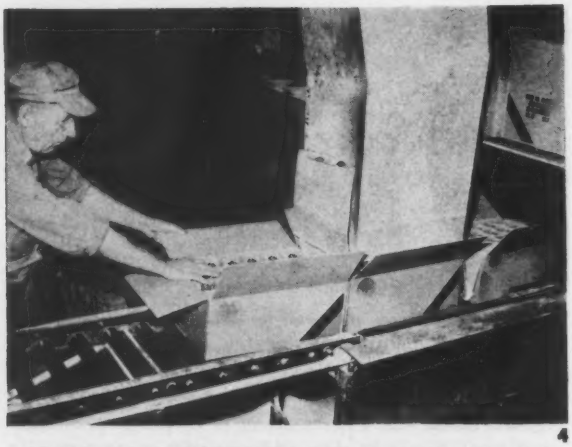
2—*Many peacetime uses will appear for such war-developed containers as this giant wood-cleated fibreboard box holding a 150-gal. fuel tank.*

Technical developments during World War II were, of course, much more highly developed than in 1917-18. Thus, the Forest Products Laboratory made enormous increase to its staff of packaging engineers and in addition operates a five-day course in training shipping men, and it is expected that the course will continue to run indefinitely. It is limited to a total of 35 men in any one week. The containers Branch of WPB has also added to its



3

3—*Wood barrels, traditional shipping containers, did a heroic export job in the early days of the war. Here large barrels of dried milk are shown as they are loaded at a North American port in the hold of a ship bound for Britain. Photo, the U. S. Department of Agriculture.*



4



5



6

4—Bottled beer goes to our troops overseas in a specially designed QMC pack which utilizes sawdust to absorb moisture and insulate against shock. 5—Rush shipments go by air in strong, weatherproof containers. This 10,000-lb. main turbine rotor is one of the heaviest items ever flown. 6—Steel bands are wrapped around food parcels dispatched to prisoners of the Axis. Photo, American Red Cross.

specialists in packaging, and the War Department has stationed packaging experts at unloading points all over the world. These special military units are known as port battalions.

The crying need during wartime is to deliver merchandise in undamaged condition but at the same time to conserve every possible pound of weight and cubic inch of cargo space. For example, millions of cases of canned goods were shipped to England on Lend-Lease and to the American Army abroad in "weatherproof" solid fibre boxes. These special boxes will withstand weeks of total immersion in water without disintegration and at the same time furnish very large savings in weight and cargo space. Cargo space is further conserved by filling in all remaining spaces in the hold with cases of canned goods or similar small packages. Trucks are now seldom loaded onto a ship empty as the truck body itself is being used to carry merchandise. The same idea of space economy can be extended almost indefinitely.

Another point that should be kept in mind by all exporters is the fact that modern machinery and military equipment is made to far closer tolerances than in the last war. Thus, an unbelievable number of items, such as airplane engine parts, are now being made to tolerances of 0.0001 inch. This means that the slightest amount of rusting of such a part renders it worthless. One of our military observers reported that he had seen a tragic sight in Egypt—a large delivery of American airplane engines and parts which had rusted in such a way that they were worthless, though most of us would not have considered this amount of rust as serious. Telephone switchboards and other delicate and strategic equipment have been shipping casualties. Shippers of such items have accordingly developed most ingenious methods of fool-proof protection.

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TACKON

MEASURING DISPENSERS AND AFFIXERS

for **TACKY TAPE**

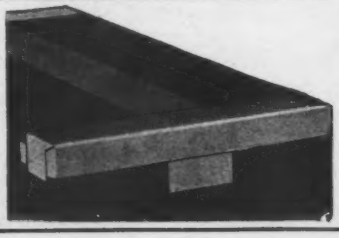
PRESSURE SENSITIVE TAPES



"THREE-THREES" TACKON

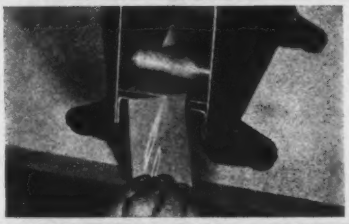
Feeds, measures, cuts and holds for quick, neat removal 9 strips of tape ½" wide x 1¼" long. You can remove 1, 2 or 3 at a time.





CARTON TACKON

For shipments overseas per U. S. Government specifications. Measures tape 3" wide in lengths up to 36" long. (A smaller model measures only up to 12" lengths.) Both models can be set for 2 different lengths,—will give either length at will.

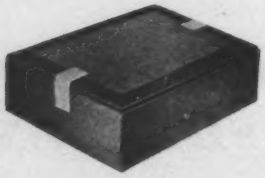




ROLLON TACKON

Wraps 1 or 2 or 3 strips of identification tape ⅜" to ½" wide around tubes, rods, cables, etc. Very fast and efficient.





PUSH OVER TACKON

You simply push box or package along table a few inches. This affixes a piece of ½" or ⅜" wide tape around one edge of the box sealing lid on. Second push applies second strip.



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BETTER PACKAGES INCORPORATED

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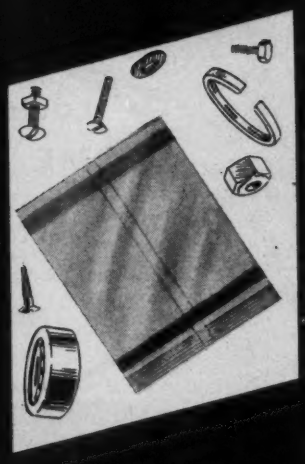
MAKERS OF *Counterboy* SEALERS

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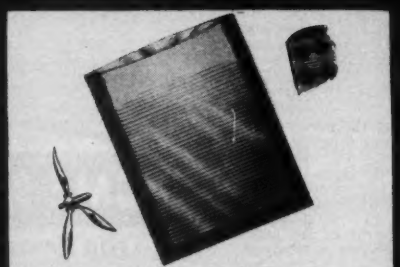
If Your Packaging Requires Bags Plan on MEHL BAGS



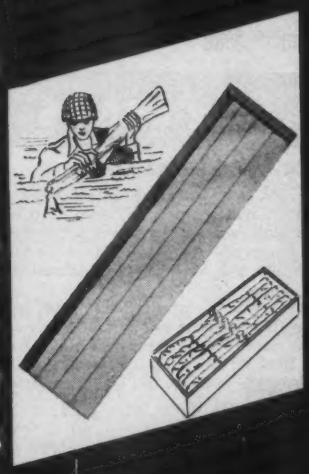
These are the Mehl Bags serving both war and essential civilian industries . . . made from cellophane, acetate, foils and papers—alone and in combination . . . providing primary and secondary packaging with waterproof, greaseproof and moistureproof protective properties. Consult us also on special problems pertaining to material, size or construction.

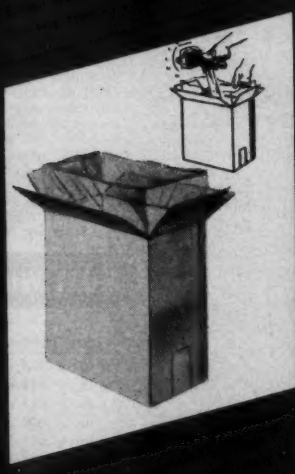






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For Method II Packing
Aluminum Foil-Kraft lamination.
Available in a wide range of sizes.





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ACME STEEL COMPANY

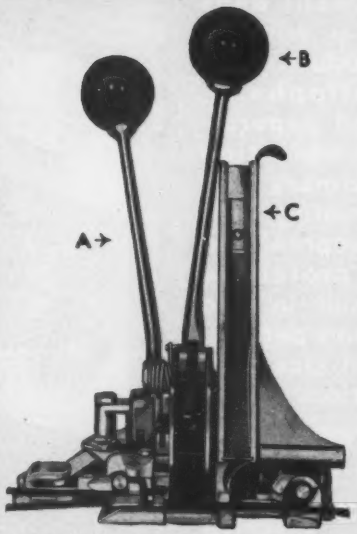


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Acme Steelstrappers TO SPEED UP STRAPPING



This tool is only one of the many Acme Steelstrap tools and accessories which comprise the most complete line of strap-applying equipment available.

(A) One stroke of this lever tensions the strap and automatically feeds a seal into the sealer jaws.

(B) One stroke of this lever seals the joint and automatically cuts the strap from the coil.

(C) This magazine holds 100 seals . . . saves the time required to feed 100 seals by hand.

Speed—economy—security—all these are possible with Acme Steelstrappers . . . the fastest seal-fed strapping tools yet developed. With a single stroke—this equipment tensions, seals and cuts strap, using two convenient levers. This speedy equipment combined with Acme Steelstrap means faster operation, lower costs and maximum protection on packs that are "Bound To Get There" — Acme Steelstrap meets all Federal Strapping Specifications. It is used to reinforce all types of shipments, both domestic and overseas . . . cartons, boxes (wooden or fibre), crates, bundles and skids. Smaller packages can be bundled into single units with Acme Steelstrap to speed handling . . . prevent loss and pilferage . . . reduce express charges. On large packs, Acme Steelstrap saves time and material . . . permits additional economies by reducing weight.

We will be glad to study your packing and shipping problems and make recommendations without obligation. Use convenient card attached.



Acme tools and accessories speedily apply Steelstrap to the entire range of shipping packs. Precision machined and constructed, Acme equipment is built for service and is easily operated. There is a type for every strapping job. The one best suited for your needs, is determined by the nature of the item strapped and by conditions under which products are packed.

ACME STEELSTRAP MEETS ALL FEDERAL STRAPPING SPECIFICATIONS.

MOST WIDELY USED SIZES

Width	Thickness	Feet Per Lb.*	Lbs. per 1000 Feet*
¼	in. x .015 in.	78.55	12.73
⅜	in. x .015 in.	52.36	19.09
½	in. x .015 in.	39.26	25.46
½	in. x .020 in.	29.45	33.96
⅝	in. x .015 in.	31.41	31.84
⅝	in. x .020 in.	23.56	42.44
¾	in. x .015 in.	26.18	38.20
¾	in. x .020 in.	19.63	50.94
¾	in. x .023 in.	17.07	58.58
¾	in. x .035 in.	11.25	88.88
1¼	in. x .035 in.	6.73	148.58
1¼	in. x .050 in.	4.72	211.86
2	in. x .050 in.	2.94	340.13

* Approximate only

ACME *Unit-Load* BANDS

FOR CARLOAD AND LCL SHIPMENTS

Eliminate unnecessary and costly bracing materials . . . speed up loading and unloading operations . . . load more material into cars . . . reduce freight charges by lessening tare weight—save labor costs. These are just a few of the advantages of the Acme Unit-Load Process. In addition, damage claims are virtually eliminated and goodwill is protected.

The Acme Unit-Load Process is a quickly applied flat steel band method of bracing carload freight . . . straight and mixed loads . . . car doors . . . pool and stopover cars. Hundreds of shippers have taken advantage of Unit-Load benefits to step-up shipments as well as to make important savings.



Shipments are made "Bound To Get There"... held in the grip of strong steel bands . . . securely tensioned and sealed around units of freight. When cars are braced with Acme Unit-Load Bands, it takes only one snip of each strap to remove the lading.

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BOXES AND CARTONS SEALED FASTER, EASIER WITH ACME *SilverStitchers*

WHAT USERS SAY . . . "Saves two operations," says one general superintendent — "Cuts cost 15%," writes the president of a prominent manufacturing concern—"Increased shipping output at least 50% and cut cost of staples"—these are comments from a few of the long list of users . . . satisfied for one reason only —because they get results . . . the kind of results you, too, can get with Acme Silverstitchers.

Acme Silverstitchers were made to replace old-fashioned sealing methods—assure stronger cartons because sealing by stitching means greater holding power and a neater job with less mess and bother. These machines matched with Acme Silverstitch Stapling Wire make a perfect combination—made to give lasting satisfaction, year after year.

(SEND ATTACHED CARD FOR FREE FOLDER.)

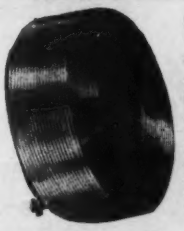
AVAILABLE IN STANDARD AND SPECIAL TYPES: The Straight Arm Silverstitcher is a heavy duty stitcher designed for fast stitching of sides and ends of many types of packs. The Bottom Silverstitcher is designed for low-cost, smooth, positive bottom stitching. Combining the straight arm and bottom stitching units in one machine, the Combination Silverstitcher is the all-around stitching equipment. Seam, top and stitchers for special applications are also available.

ACME *SilverStitcher* FEATURES

Adjustable single pedal control • Few moving parts mean lower maintenance costs • Vital parts are reversible • Low power consumption • Heavy duty construction for long service • Silent V belt drive • Wide, comfortable foot rest treadle • Resilient one-piece feed wheels • Handles two gauges of Silverstitch without adjustment • Conveniently placed starting and stopping toggle safety switch • Over-feed with adjustable spring tension and unique wire friction plug provide constant and even flow of wire • Extra long life of main drive anti-friction bearing assured by use of genuine Promet bronze • Mechanism guarded for maximum safety • Individual parts are precision made and are interchangeable • Friction brake spring maintains continual pressure on clutch hub and simplifies brake adjustments • Easy to operate . . . runs smoothly and quietly • Efficient • Modern • Economical • Guaranteed.

ACME *SilverStitch*

FOR SPEED AND ECONOMY IN STAPLING

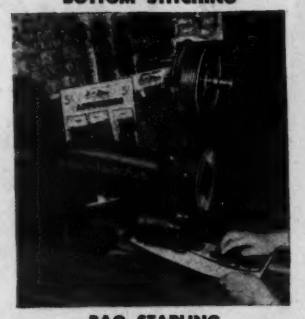


Stapling is faster—more boxes can be stitched per day with Acme Silverstitch Stapling Wire. Uniform in temper, width and thickness. There are fewer stops for coil changes as Acme Silverstitch is supplied in *one piece*—five and ten-pound coils. Acme Silverstitch is rust-resisting . . . assures extra strong stitches that clinch and stay tight . . . Silverstitch is packaged for your convenience.

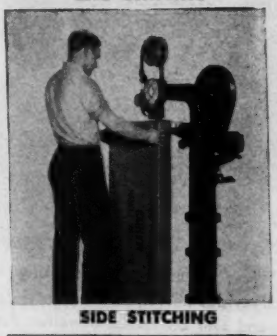
Width	Thickness	Feet Per Lb.	1" Staples Per Lb.	1¼" Staples Per Lb.
.103 in.	.014 in.	211	2530	2020
.103 in.	.017 in.	175	2100	1680
.103 in.	.020 in.	148	1780	1420
.103 in.	.023 in.	129	1550	1240
.060 in.	.024 in	222	2665	2130
.060 in.	.0205 in.	260	3120	2500



BOTTOM STITCHING



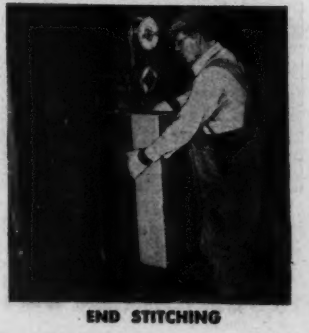
BAG STAPLING



SIDE STITCHING



BAG SEALING



END STITCHING

ACME *SilverStitcher* SPECIFICATIONS

STRAIGHT ARM SILVERSTITCHERS are available in four throat sizes—12", 20", 25" and 30". These figures indicate the maximum carton depths which can be accommodated and represent the distance between the front of the frame and the clinching point. The size required is determined by the depth of the container or the nature of the article to be stitched.

Distance from floor to top of arm (clinching point): On 12" size—44"; on 20" size—46"; on 25" size—46"; on 30" size—48".

Distance from top of base to top of arm (clinching point): On 12" size—40"; on 20" size—42"; on 25" size—42", on 30" size—44".

Sizes of Silverstitch used — all standard sizes which include .014, .017, .020, .023; .060 x .024 and .060 x .0205.

Width of crown of standard staples: On 12" size—7/16"; on 20", 25"and 30" sizes—½".

Motor: ¼HP single-phase long hour duty; 110 or 220 volt, 60 cycle, A.C. Other voltage, current and phase required, available at slight additional cost.

Speed: Depending upon application and dexterity of operator, speed is set before leaving factory at any one of the following approximate number of staples per minute—170, 200, 230, 260 and 285. If speed is not specified, stitcher is set for about 230 staples per minute.

Diameter of silent action V belt driving pulley . . . 14".

Floor space required:

On 12" size—20" x 36"; on 20" size—22" x 44"; 25" size — 24" x 44"; on 30" size — 22" x 50".

BOTTOM SILVERSTITCHERS are available in three throat sizes — 12", 20" and 25". These figures represent the distance between the front of the frame and the clinching point in stitching position.

Maximum dimensions of packs handled on 12" size—24" x 24" x 40"; on 20" size—40" x 20" x 42"; on 25" size—50" x 50" x 42".

Distance from floor to top of post (clinching point): On 12" size—44"; on 20" size—46"; on 25" size—46".

Distance from top of base to top of post (clinching point): On 12" size—40"; on 20" size—42"; on 25" size—42".

Sizes of Silverstitch used — all standard sizes which include .014, .017, .020, .023; .060 x .024 and .060 x .0205.

Width of crown of standard staple . . .½".
Motor: ¼ HP single-phase long hour duty; 110 or 220 volt, 60 cycle, A.C. Other voltage, current and phase required, available at slight additional cost.

Speed: Depending upon application and dexterity of operator, speed is set between 170 to 285 staples per minute. If speed is not specified stitcher is set for about 230 staples per minute. This will handle the complete range mentioned above.

Diameter of silent action V belt driving pulley . . . 14".

Floor space required:

On 12" size—20" x 40"; on 20" size—22" x 48"; on 25" size—24" x 52".

COMBINATION SILVERSTITCHERS are available in three throat sizes—12", 20" and 25".

Width of crown of standard staple—½". Other specifications same as those above.

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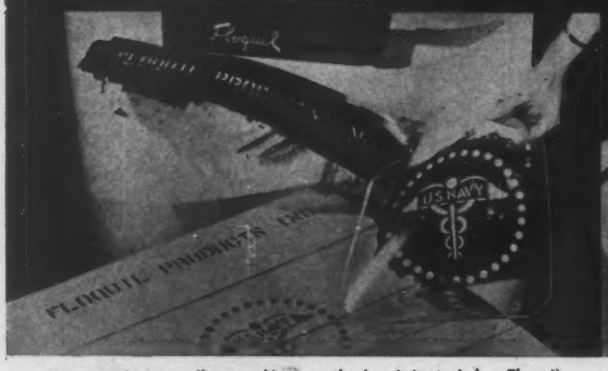
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Save "hard-to-get" cartons, crates, containers, etc. Floquil Re-Mark-Able Salvage Kraft* and Floquil Roller Marker obliterates all old markings. One coat covers! Instantly, surface is dry and ready for re-marking. One government agency reports: $2.65 worth of Floquil Salvage Kraft salvaged $500 worth of packing material.

Informative Literature on Request

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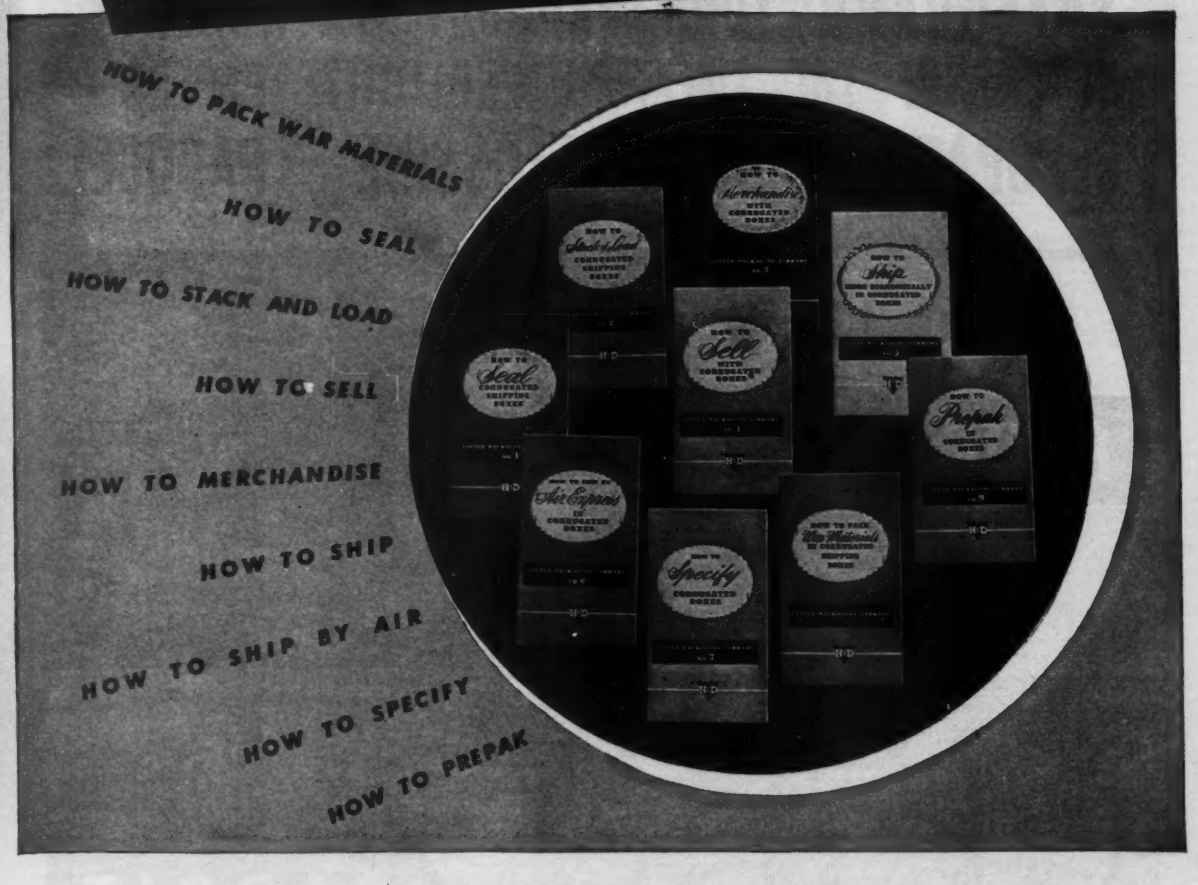
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Whatever your packaging assignments are today — whatever they will be tomorrow, these booklets will prove of value to you and your organization. The booklets are FREE without obligation — write for as many sets as you need. Address Hinde & Dauch, 4539 Decatur Street, Sandusky, Ohio.

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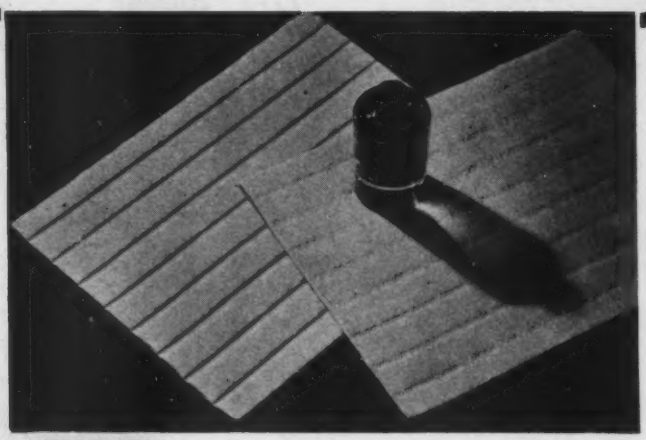
PACKAGING CATALOG 825

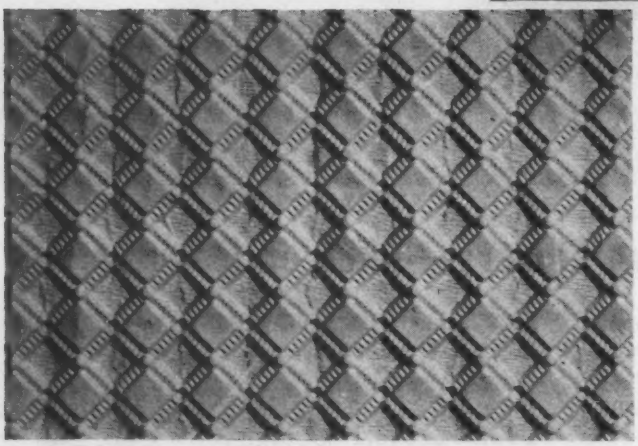
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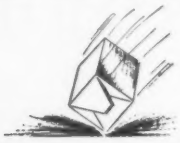
Kimpak

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CREPED WADDING

A PRODUCT OF Kimberly Clark RESEARCH

KIMPAK* offers revolutionary advantages which will solve many of your postwar packaging problems. For example, it will enable you to cushion products adequately without bulk. It will do this more economically and quickly. What is more, it is attractive, gives any product a "jewel-box" setting . . . Compare these KIMPAK advantages with features of any other packaging.



✔ **CUSHIONS AGAINST SHOCK**—KIMPAK provides a more effective cushion against jolts and jars than many packaging materials of far greater bulk. It is available in various thicknesses, to meet different needs. Fragile glass ornaments, delicate precision instruments, heavy machinery can be protected with equal dependability by KIMPAK.



✔ **PROTECTS AGAINST ABRASION OR CHIPPING**—Products properly wrapped in KIMPAK are protected against scratches, chafing, or chipping. This material is cloud-soft, non-abrasive, contains no particles which could damage the most sensitive surface. KIMPAK is widely used for slip-sheeting shiny silver, china plates, metal and plastic, and other finely finished articles.

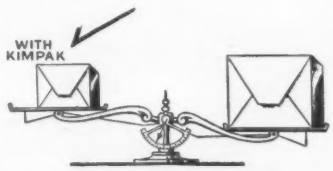


✔ **SAVES PACKAGING TIME**—The various types of KIMPAK are each purpose-made for specific packaging needs. Hence each is more easily applied, saves a great deal of packaging time. Kimpak can be quickly cut to any exact size desired. It molds readily around odd shapes, can be tied or taped.





✔ **REDUCES NEED OF OTHER PACKAGING MATERIAL**—Certain types of KIMPAK do triple duty—as a pad to float the product, as a wrapper, and as a separator to keep it from shifting or coming in contact with other units in bulk shipments. Thus, this one material often replaces separately applied loose-fill, cells, and separators.



✔ **REDUCES PACKAGE SIZE AND WEIGHT**—Because KIMPAK more thoroughly absorbs shocks and jars than most materials of *far greater density and thickness*, it greatly reduces the bulkiness of your package. This cushioning is very light in weight, moreover. No other material provides comparable protection with less bulk or shipping weight.

★

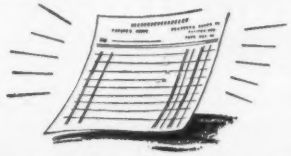
*KIMPAK (*trade-mark*) means Kimberly-Clark Wadding*



✔ **KEEPS PACKAGING DEPARTMENT NEAT**—Compact KIMPAK takes comparatively little space in your shipping department. It comes in convenient, well packaged, easily stored rolls or sheets. It is clean, and does not cover the department with siftings and fragments as do "loose" materials used in bulk packaging.



✔ **PLEASANT, SAFE TO HANDLE**—KIMPAK is clean, odorless, free from grit, splinters and other foreign matter; is pleasant, safe to handle. People in your packaging department will like to work with it.



✔ **SAVES COST**—For a vast number of products, KIMPAK is the most economical cushioning obtainable. For it is inexpensive to buy, requires little time or skill to apply and lowers shipping cost by reducing package size and weight.

XUM



There's a KIMPAK for Every Purpose

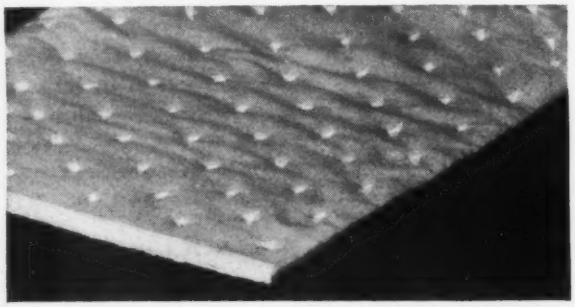


PLAIN TYPE 500 (Unembossed, Unbacked) — For cushioning of odd-shaped articles such as delicate instruments or assemblies, for loose-fill and bulk stuffing in shipping container. Water-resistant character makes this especially suitable for over-seas shipment.

Plain (Unembossed, unbacked) Type 500; water-resistant KIMPAK; is available in sheets and rolls: rolls in widths ranging from 3″ to 80″, sheets in widths 3″ to 45″. It comes in thicknesses of 10 to 80 ply (approx. ¼″ to 2″).

"DIMPLE" EMBOSSED TYPE 500 — A thick, protective pad, especially adaptable to export packing where severe moisture conditions are anticipated. For all packing of heavy machinery, armament, aircraft sub-assemblies, etc. So highly resistant to moisture it will float indefinitely on water.

In sheets 3″ to 40″ wide and rolls 3″ to 48″ wide; in thicknesses of 15, 20, 30 and 50 plies (0.25″, 0.30″, 0.37″, 0.50″ thick). It is available backed with 20, 40, 60 lb. Kraft paper, and with 20-60-20 waterproof Creped-Kraft.



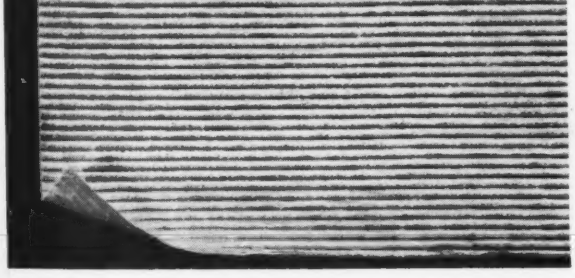
PUNCH EMBOSSED TYPE 300 — Developed for shock absorption and protection of fine finishes for domestic shipments. This type of KIMPAK supplies a thick, resilient cushion with high moisture absorption. Meets government postal regulations for shipment of liquids.

Available in sheets 2″ to 48″ wide, and rolls of 2″ and 48″ widths. 10 to 50 ply thicknesses (approx. 0.14″ to 0.71″ thick). Backed with a choice of 7 different papers to meet individual requirements.



WRAPPED PAD — Meets Army Air Force specifications for products going overseas. This pad absorbs violent jolts, is also especially well adapted for meeting severe moisture conditions. Wrapper and sealing tape are 100% waterproof, non-abrasive, tough and flexible.

Comes in rolls 3″ to 12″ wide, and 40 to 100 ply thicknesses (approx. 0.40″ to 1″ thick). Backed with 20-60-20 waterproof Creped-Kraft.



"WHIPCORD" EMBOSSED TYPE 4 — Used for protective wrapping of products with delicate surfaces such as plastics, china, silverware, and jewelry. Also as slip-sheets between high-finish flat sheets of plastic or metal in shipment, for plate pads, as wrapping for candles, soap and cosmetics, and for wiping and polishing purposes.

"Whipcord" Embossed Type 4 is available in sheets 2″ to 40″ wide and rolls of 2″ to 40″ widths; in 4, 6, and 8 ply thicknesses (.008″, .0130″, .016″ thick). Various backing papers.



FRENCH-WRAP TYPE 500 — A complete unit providing both a wrapping and a protective cushion for small, easily damaged articles. Especially useful in shipping items which are first packaged individually, then cartoned together. Often eliminates partitions and extra inner-wrappings.

A KIMPAK French-wrap consists of KIMPAK Type 500 glued to a 30 lb. Kraft backing sheet. Available in wadding widths 8″ to 13″. Paper widths 21″, 24″, 25½″; thickness — 20 to 50 ply (approx. ½″ to 1¼″ thick).

These are only a few of many types of KIMPAK

KIMBERLY-CLARK CORPORATION • NEENAH, WISCONSIN

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INLAND

CORRUGATED FIBRE BOXES



Sales Offices

Chicago, Illinois	Dayton, Ohio	Canton, Ohio
Cincinnati, Ohio	Milwaukee, Wis.	Evansville, Ind.
Lima, Ohio	Middletown, Ohio	Indianapolis, Ind.

Inland Container Corporation

General Offices . . . Indianapolis

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For sealing safety use Counterboy AUTOMATIC MOISTENING CONTROL



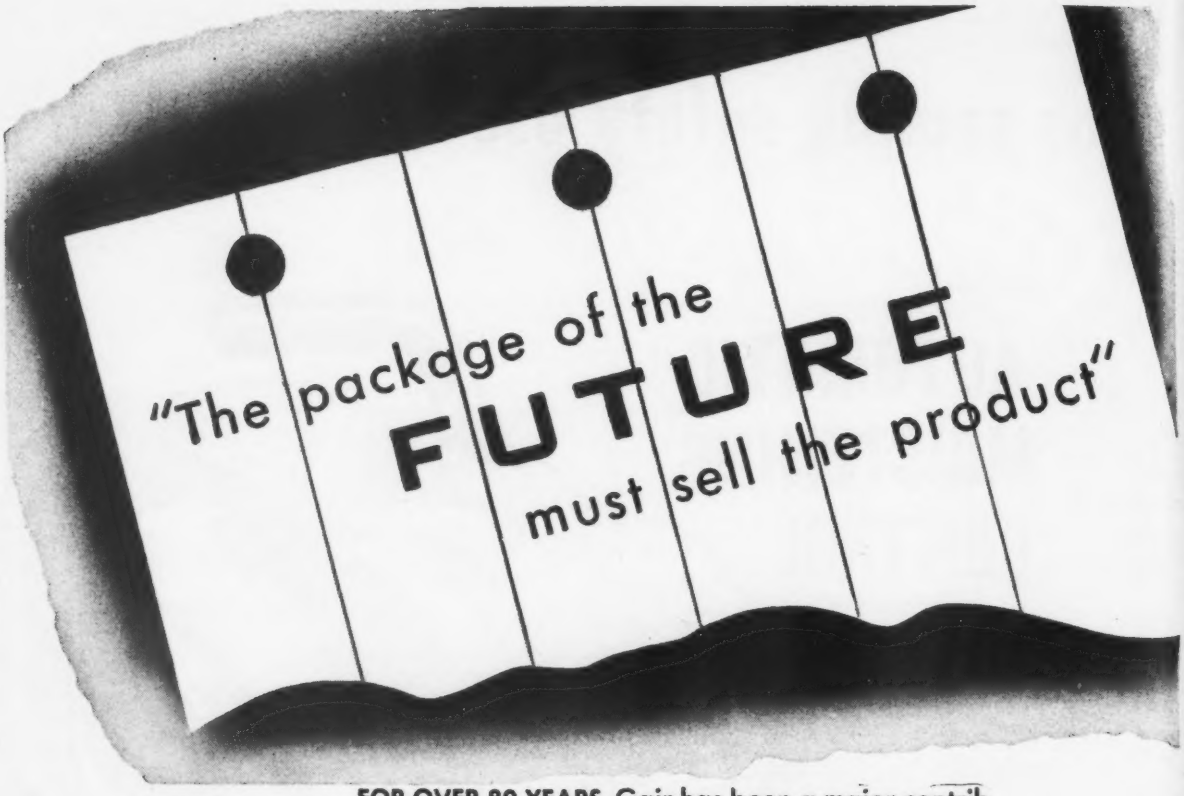
The moistening principle recommended by American Railroads and The Gummed Industries Associations.

THIS TAPE-SHOOTER IS EQUIPPED WITH THE PATENTED MOISTENING UNIT INVENTED BY BETTER PACKAGES, INC.

Better Packages
INCORPORATED

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FOR OVER 80 YEARS, Gair has been a major contributor to the art of packaging. Many of the great industries of America and the world have turned to Gair to solve their packaging problems. Many an obscure product has achieved international distribution due to the ingenious packaging ideas of Gair — from the cracker barrel and hoop skirt era to frozen foods. The principles of packaging that are meeting with rigid war-time standards will be utilized in packaging everything from pencils to plow shares. Send your present and postwar packaging problems to Gair.



Appealing, appetizing designs will sell the product. This Sunshine Fancy ASSORTMENT is printed in full color right on Gair Patent coated paper board. Another famous Gair design and product. Write for Printers' Ink article by Egmont Arens industrial designer in which this Package appears.

SAVE GAIR WASTE PAPER

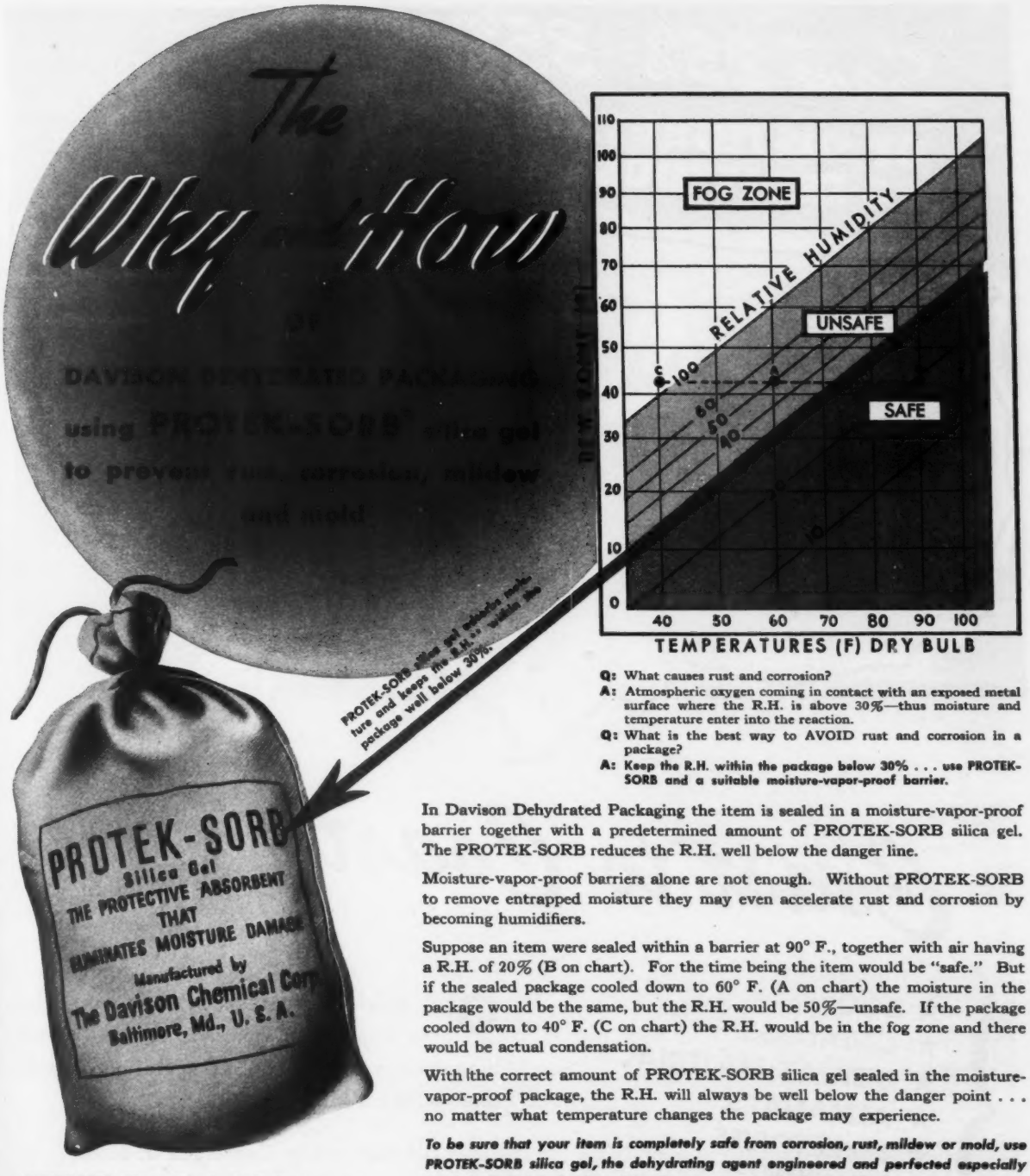
WRITE FOR BOOKLET "FASHIONS IN CARTONS"

ROBERT GAIR COMPANY, INC., NEW YORK • GAIR COMPANY CANADA LIMITED, TORONTO

Folding Cartons • Box Boards • Fibre and Corrugated Shipping Containers

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PROTEK-SORB silica gel is chemically inert . . . a hard, rugged material . . . gives off no corrosive or injurious compounds as it becomes saturated with water vapor. *Reg. U. S. Pat Off.

Q: What causes rust and corrosion?

A: Atmospheric oxygen coming in contact with an exposed metal surface where the R.H. is above 30%—thus moisture and temperature enter into the reaction.

Q: What is the best way to AVOID rust and corrosion in a package?

A: Keep the R.H. within the package below 30% . . . use PROTEK-SORB and a suitable moisture-vapor-proof barrier.

In Davison Dehydrated Packaging the item is sealed in a moisture-vapor-proof barrier together with a predetermined amount of PROTEK-SORB silica gel. The PROTEK-SORB reduces the R.H. well below the danger line.

Moisture-vapor-proof barriers alone are not enough. Without PROTEK-SORB to remove entrapped moisture they may even accelerate rust and corrosion by becoming humidifiers.

Suppose an item were sealed within a barrier at 90° F., together with air having a R.H. of 20% (B on chart). For the time being the item would be "safe." But if the sealed package cooled down to 60° F. (A on chart) the moisture in the package would be the same, but the R.H. would be 50%—unsafe. If the package cooled down to 40° F. (C on chart) the R.H. would be in the fog zone and there would be actual condensation.

With the correct amount of PROTEK-SORB silica gel sealed in the moisture-vapor-proof package, the R.H. will always be well below the danger point . . . no matter what temperature changes the package may experience.

To be sure that your item is completely safe from corrosion, rust, mildew or mold, use PROTEK-SORB silica gel, the dehydrating agent engineered and perfected especially for dehydrated packaging. Consult us on your packaging problems.

**Relative Humidity (R.H.) is not an expression of the absolute moisture content of air; R.H. expresses the moisture content as a percentage of saturation at the existing temperature. Therefore R.H. is a function of temperature as well as moisture content.

THE DAVISON CHEMICAL CORPORATION

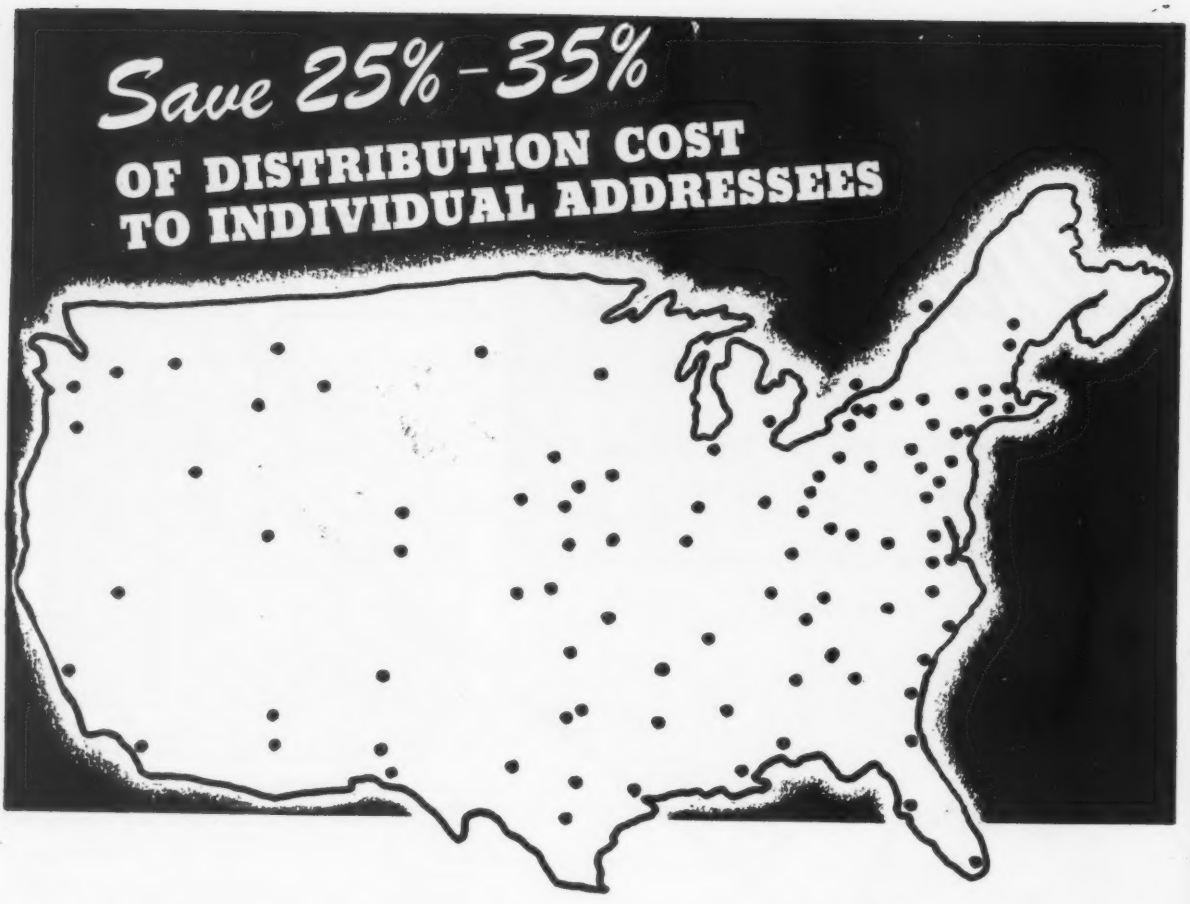
Progress through Chemistry

BALTIMORE-3, MD.

Canadian exclusive agents for PROTEK-SORB silica gel: CANADIAN INDUSTRIES LIMITED, General Chemicals Division

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Coast to Coast!

- ★ BOOKS
- ★ CATALOGS
- ★ DISPLAY MATERIAL
- ★ ALMANACS
- ★ DIRECTORIES
- ★ SAMPLES

OUR special distribution system is used by the largest publishers and national advertisers to save 25% to 35% as against parcel post rates ***with no loss of time.***

154 Distributing Centers in U. S. A.
Detailed Information Upon Request.

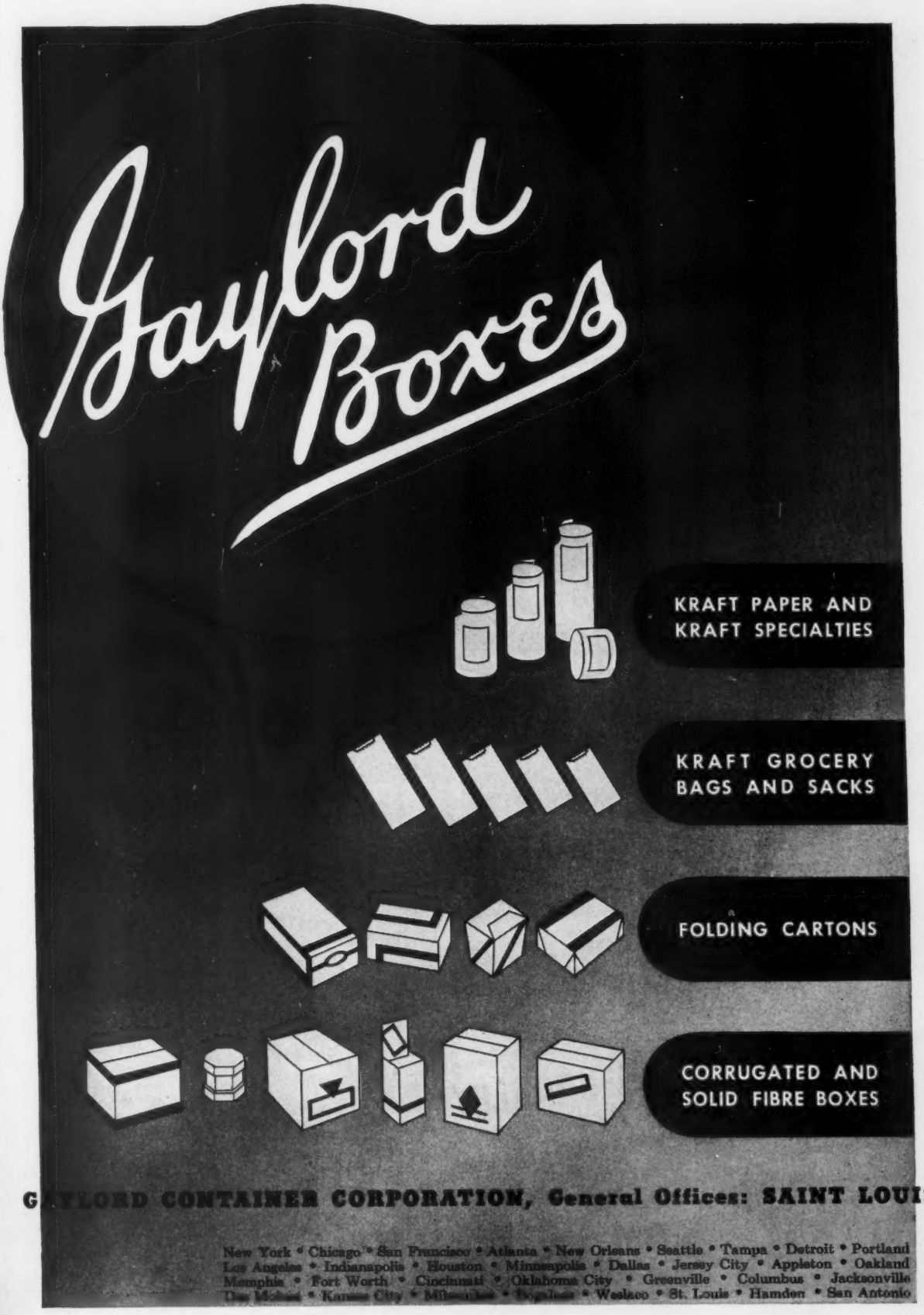
Whaling DISTRIBUTING CORP.

ECONOMICAL NATIONAL DISTRIBUTION

75 VARICK STREET • NEW YORK CITY

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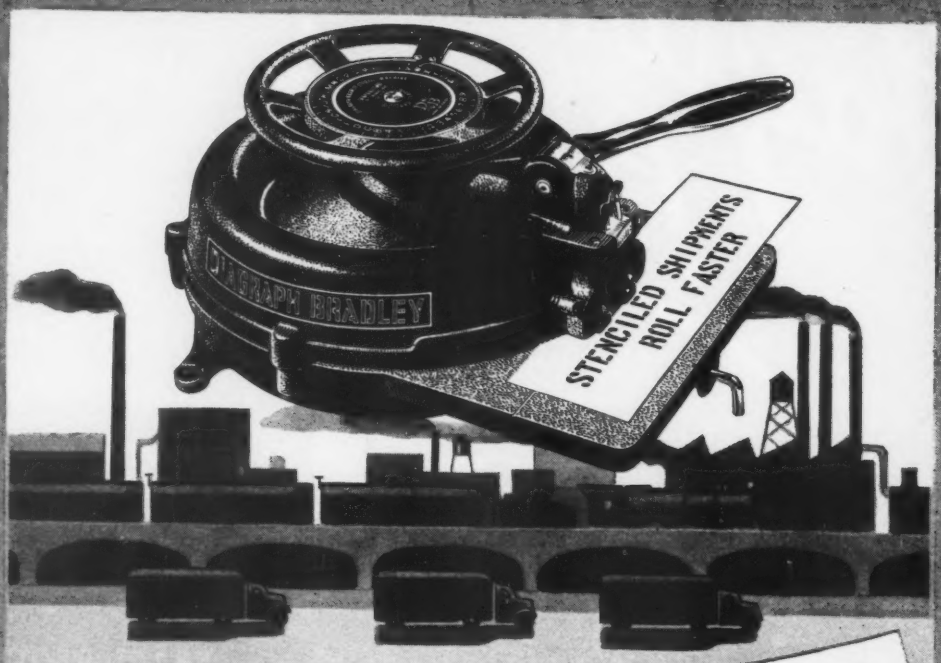
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Gaylord Boxes
KRAFT PAPER AND KRAFT SPECIALTIES
KRAFT GROCERY BAGS AND SACKS
FOLDING CARTONS
CORRUGATED AND SOLID FIBRE BOXES
GAYLORD CONTAINER CORPORATION, General Offices: SAINT LOUIS
New York • Chicago • San Francisco • Atlanta • New Orleans • Seattle • Tampa • Detroit • Portland
Los Angeles • Indianapolis • Houston • Minneapolis • Dallas • Jersey City • Appleton • Oakland
Memphis • Fort Worth • Cincinnati • Oklahoma City • Greenville • Columbus • Jacksonville
Kansas City • Weslaco • St. Louis • Hamden • San Antonio

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STENCILED SHIPMENTS ROLL FASTER



STENCIL ADDRESS YOUR SHIPMENTS

STENCIL MARKED SHIPMENTS WITH EASILY READ, PERMANENT STENCILED MARKINGS—roll faster and costly delays in transit are eliminated.

DIAGRAPH-BRADLEY MANUFACTURES STENCIL CUTTING MACHINES FOR EVERY SHIPPERS NEEDS.

Letter sizes ½", ¾", ⅞", 1¼", 1½" and 1¾"

FOR BETTER MARKINGS USE

- D-B INKS • D-B STENCIL BOARDS
- D-B FOUNTAIN STENCIL BRUSHES
- D-B FOUNTAIN MARKING PENCILS
- D-B STENCIL CUTTING MACHINES

COMPLETE SHIPPING ROOM SUPPLIES

*Reg. U. S. Pat. Off.

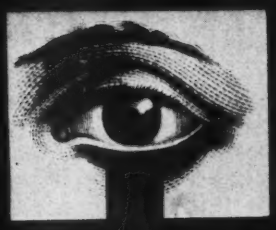
D.B.

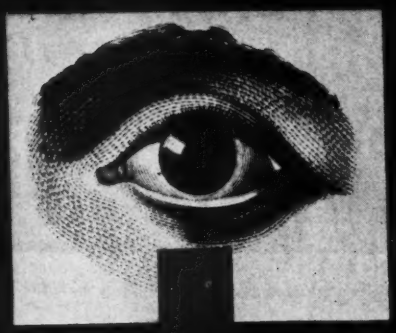
DIAGRAPH-BRADLEY
STENCIL MACHINES
NO. 88 DIAGRAPH-BRADLEY BUILDING
ST. LOUIS 8, MISSOURI
DISTRIBUTORS IN PRINCIPAL CITIES
See Classified Section—Telephone Book • STENCIL CUTTING MACHINES

WORLD'S OLDEST AND LARGEST MANUFACTURERS OF STENCIL CUTTING MACHINES

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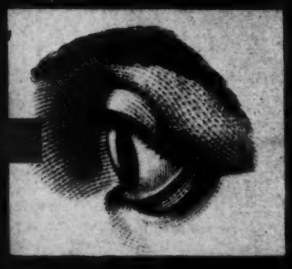
MERCHANDISING











Display as a merchandising force 838

New structures for paper displays 840

The dealer factor in displays 842

Jobs which displays can do 844

Measuring display circulation 846

Relating displays to other media 848

Fitting displays to the sales spot 851

Preparatory work 856

Wood displays and cabinets 859

Displays will be lighted again 861

Corrugated display materials 863

Crepe paper for displays 865

Plus values of the corrugated box 867

Display in the store 869



1—*This kind of display takes the observer's mind off problems of shortages and dealers gladly install it. Photo, Forbes Lithograph Manufacturing Co.*

Display as a merchandising force

In spite of empty shelves and scant stocks, retail dealers have been scrupulously careful to keep their windows attractive during the shortage era. If proof were needed, this alone would be sufficient to demonstrate that as long as goods are sold through retail stores, displays will be welcomed by both dealer and consumer. When—in the near future, we hope—competitive merchandising returns in full flower, store displays will be more in evidence than ever.

Early in the war, when shortages of merchandise first became acute, some advertisers said, "We'll continue to use store displays anyway." At that time, some of the retailers protested, saying, "Why should we irritate our customers by showing displays of goods that we haven't got to sell them?" As a result, did displays die a complete death? They did not! The more alert advertiser selected subjects and illustrations for displays that made capital of his inability to supply his usual products and—to use the hackneyed expression—kept his name alive in the absence of his merchandise. By now, most dealers have quit their protesting.

The term "store display material" is an inclusive one, which takes in:

1. Window material—displays, backgrounds, door transparencies and decalcomanias, posters, cards
2. Counter pieces—easel cards, small displays and dispensers
3. Floor materials—large cutouts, "island" displays and merchandisers
4. Wall materials—shelf hangers, festoons and fountain trims

All of these media are direct leads to actual sales at the retail store, where the potential consumer comes into contact with the actual product, in the buying mood, armed with the means to purchase. Other forms of advertising create a desire—or at least that is their intention; but that desire is aroused at a point remote from the opportunity to buy. The power of display material lies in the fact that it makes use of color, size and construction to re-arouse that desire and remind consumers of their needs at the very spot where the merchandise is to be found.

It must be remembered, however, that the retail store is merely a channel for a number of items ranging from 200 to 28,000 in number. Neither proprietor nor clerks can be expected to tell the individual story of all these products. The experienced merchandiser will not rely on them to give his products individual attention. He will speak for himself at the sales outlet with appropriate display material.

As a rule, alert dealers welcome such sales helps. With few exceptions, retailers are proud of their stores. They are particular about matters of appearance, quality of merchandise, and they are eager to sell their goods. Speaking generally, they are much closer to the consumer than is the manufacturer, and, while they may not be as articulate as members of the advertising fraternity, they have pretty positive ideas—based on experience—about

the pulling power of different kinds of displays. They rightly place a high value on using their windows to get customers into the store. They need "dealer helps" and will gladly use the kinds which are intelligently prepared with the dealers' needs in mind.

Unfortunately, too often this type of advertising is added to an otherwise well-prepared program only as a last minute thought—one which tags along after national advertising is all scheduled and package designs completed. "Store display," says a nationally known merchandiser, "is the important last link in the distribution chain between producer and consumer."

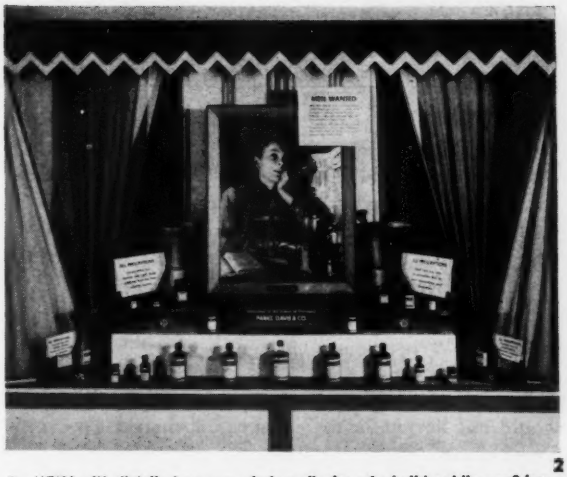
Because it is used at the store, display as a medium has certain advantages. One of these is selectivity. Magazine circulation has the tremendous power of overall coverage of a class market, reaching its prospects wherever they may be located. Store displays can be spotted in selective spots where these prospects may be found in greatest number, and window display "circulation" can be utilized to cover a specified zone selected with reference to the distribution of a product; or, if the advertiser chooses, window display can be used as a major medium to blanket the entire nation. (For further information about this aspect, see *Measuring Display Circulation,* p. 846.)

The power of display material is also manifested in its ability to do "team-work" with other forms of advertising. Merchandisers have tested this power. In one zone or region of distribution, the general advertising program will be supported by the use of store material; another region—where presumably the space advertising program is equally potent—will have no such point-of-sale support. Then, comparison of sales results usually demonstrates the actual potency of store display in the selling of its wares.

In many instances, too, where the manufacturer's distribution does not warrant a national campaign, the use of store display alone, without the influence of other advertising, has proved effective in building up consumer sales. Perhaps the reader can recall instances where he himself has made the purchase of an article he had never heard of, simply through seeing it vividly and colorfully presented by means of a store display at the point where the purchase could be made.

Mention should be made again of the need for providing displays with the dealers' needs in mind. This involves a merchandising approach to the problem of preparation. "Ideas" for displays probably do not come from inspirations or sudden flashes of genius, but from a clearly thought out analysis of the marketing aspects of the particular product. This, of course, must begin with a full knowledge of the product itself and its features. Next there must be an acquaintance with the complete advertising and promotion program. Above all, it is imperative to be completely familiar with the full distribution setup.

If a display program is to produce the results which may very properly be expected of it, plenty of time should be allowed for its preparation. This is particularly true at the present time, when every activity suffers manpower shortages and priority war work takes precedence over civilian merchandising programs, to say nothing of the necessary restrictions of materials. In ordinary times, four to six weeks from the time of approval of a finished sketch to the delivery of the display material is usually ample, even for difficult and complicated constructions. The display user can facilitate delivery by pushing through the preliminaries which must precede the approval of sketches. Many display users, who are not familiar with production processes of the materials they use, become impatient and wish delivery very shortly after they O.K. the art work. These processes can't be hurried if good work is to be done; the reasonable customer will give the lithographer plenty of time.



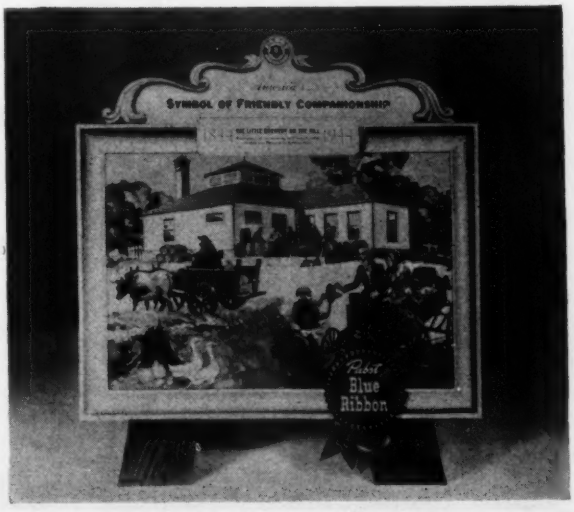
2

2—"Ethical" distributors use window displays to build public confidence in products for compounding prescriptions. Photo, Einson-Freeman Co.

There is waste circulation in every advertising medium. Store display is no exception. Its wastes occur mainly through failure of dealers to use the material, which in turn may be due to its inappropriateness to product or outlets, or to the method chosen for its distribution. Properly conceived and intelligently distributed, however, store display material is a real merchandising force.

3—Celebrating 100 years of brewing, this display gives a favorable impression of stability. Photo, Erie Plant, The U. S. Printing & Litho Co.

3



New structures for paper displays

by Richard E. Paige

The American public has had an overdose of postwar predictions and imaginative sketches of the wonders of tomorrow. Magazines are full of sketches of such "wonders" by artists who haven't the slightest conception of the practical aspects of their slick-looking brain children.

Some of the new developments in display construction, however, are thoroughly practical and yet startlingly novel, and they only await the release of materials which *may* come with the war's end. Such sketches as these should not be put in the category of the sketches mentioned above.

Because this article is directed to those concerned with the production and use of lithographed cardboard displays, a word of warning concerning the postwar period may not be amiss. The word postwar is broad and almost meaningless (for our purposes). It means "the time after the war." In your postwar planning, be careful not to stub your toes on tomorrow because you have your eyes on 1955. This year and next, you will probably see a partial release of materials, but these won't provide your dream-of-tomorrow type of displays.

Despite the ads we see all around us, you will not run over to your golf club in your helicopter immediately after the war, nor will you and your wife stay home on Saturday night to watch the full-color television show. Both will come, definitely; but meanwhile do not hesitate to buy a new car or radio while you are waiting for other developments.

Like helicopters, rocket planes, and television, advances in display construction are slow in growth. They are not just the results of a "flash out of the blue." The successful display of tomorrow will be a growth and development of the many things we learned, tested, and found promising—yesterday.

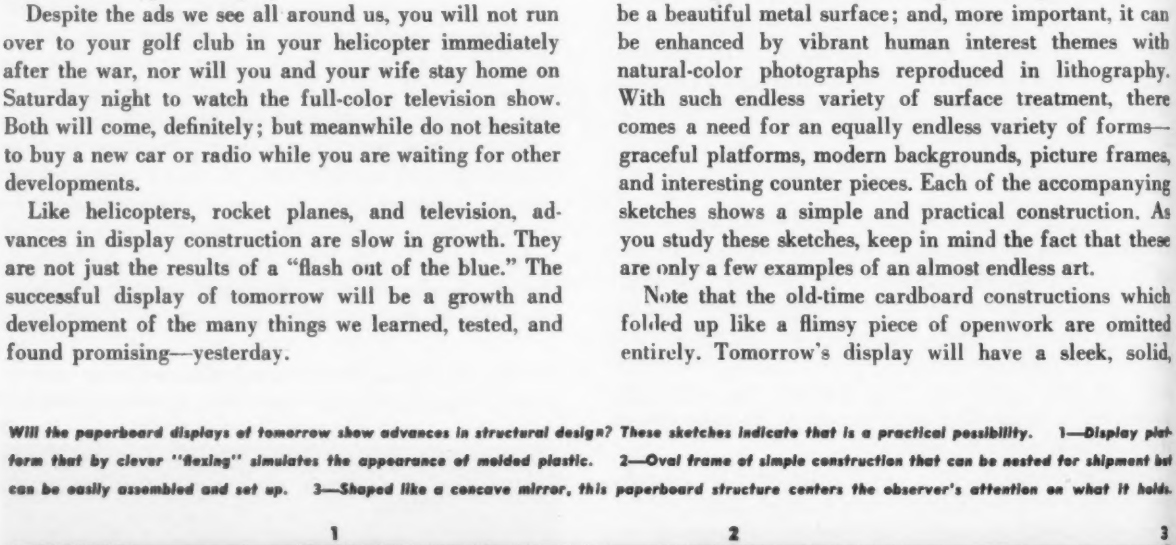
The discoveries of new principles for the use of folding cardboard for display have been discussed in previous issues of this volume. With encouragement and practical use by such leaders in advertising as Calvert, Coty, Coca Cola, Christian Brothers, and others, there has been a rapid growth of these new principles of construction, so that each new principle is becoming a broad art in itself.

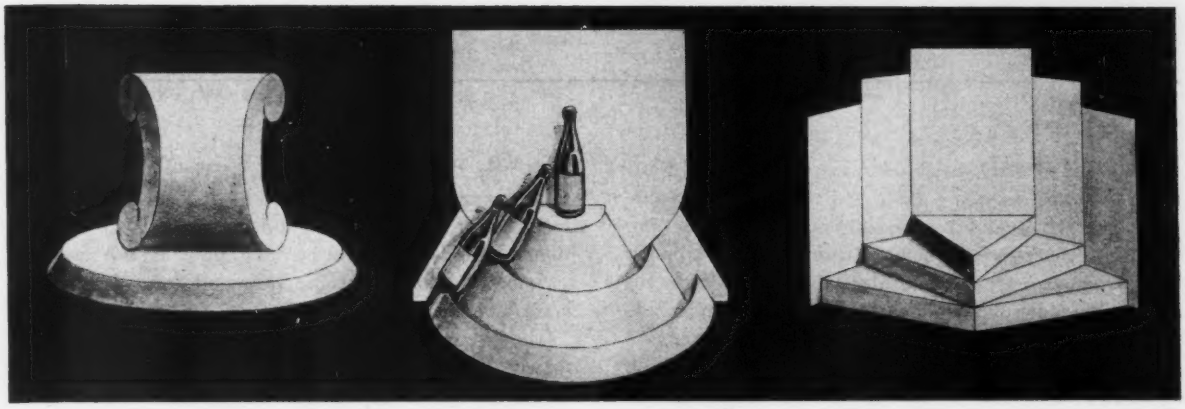
The surface decoration of displays has also forged ahead tremendously in the past ten years. As a "team," lithography and construction made the lithographed cardboard display the broadest and most versatile display medium available to advertisers.

No one can deny the importance of the other display media, for each has its specific use and frequently can serve a purpose for which cardboard is impractical. Displays of plastic, wire, metal, glass and wood will compete with cardboard in postwar markets; but for wide distribution, low cost and almost endless variety of appearance, no other display medium equals lithographed cardboard. It can be made to resemble a rich wooden fixture; it can be given the smooth flowing lines of plastic; it can be a beautiful metal surface; and, more important, it can be enhanced by vibrant human interest themes with natural-color photographs reproduced in lithography. With such endless variety of surface treatment, there comes a need for an equally endless variety of forms—graceful platforms, modern backgrounds, picture frames, and interesting counter pieces. Each of the accompanying sketches shows a simple and practical construction. As you study these sketches, keep in mind the fact that these are only a few examples of an almost endless art.

Note that the old-time cardboard constructions which folded up like a flimsy piece of openwork are omitted entirely. Tomorrow's display will have a sleek, solid,

Will the paperboard displays of tomorrow show advances in structural design? These sketches indicate that is a practical possibility. 1—Display platform that by clever "flexing" simulates the appearance of molded plastic. 2—Oval frame of simple construction that can be nested for shipment but can be easily assembled and set up. 3—Shaped like a concave mirror, this paperboard structure centers the observer's attention on what it holds.





4 5 6

While shortages curtail present uses of displays, experimentation goes on which will assure interesting applications when paper is again plentiful. 4—Classic design influences the appearance of this scroll, made from a single piece of paperboard. 5—This platform made from 40-point board will hold 100 lb. weight. 6—By an original method of "flexing" this display assumes a structure suitable for displaying articles of different shapes.

three-dimensional appearance. That "finished" look will not cost more; it will probably cost less, because it will come about through knowledge of how to handle the material more efficiently, and not through the use of more material.

New principles of construction

Figure 1 shows a new way to produce a display platform that has the smooth molded lines of molded plastic, and yet ships flat, sets up easily, and is inexpensive to produce. It is made of a single piece of stock. This is only one of the thousands of possibilities with circumflexion, which is one of 7 new principles of handling cardboard in making displays.

It is a process of scoring and folding a flat piece of cardboard, and should not be confused with forms that are stamped out of metal, like automobile fenders. The unusual contours result from the shape of the score lines and from the unique methods which are applied in flexing them.

Figure 2 is an oval frame which can be manufactured set-up so inexpensively that it isn't necessary to depend on the dealer being able to put it together correctly. These frames nest for bulk packing like a stack of soup plates. The same principle can make a circular, square, hexagonal, or octagonal frame. The frames are all one piece; and even the rectangular ones require no joining at the corners.

Figure 3 is a saucer-like background that centers attention on anything placed before it. The lights and shadows make this a development of great beauty.

Figure 4 is a graceful modern scroll that looks almost architectural in its solidity, and yet it is only a single piece of cardboard formed by 2 curved scores, and costs little more than a flat card. It can be incorporated into a window display or even used as a hanging sign; it is quite versatile.

Figure 5 is a development that you have to see in order to believe. A platform made of 40-point board is scored in such a way that it becomes far stronger than one made of 100-point board that was scored by the old straight-scored method. The 40-point platform will hold 100 pounds in weight, but does not require any under-support. Bottles and jars lie back at a safe angle and form an effective pyramid. Any number of tiers can be formed. This is an excellent way to display things that have a tendency to fall or roll off the ordinary display—rubber balls or oranges, for example, won't roll off these tiers, and neither will the bottles in the illustration.

Figure 6 is a unique platform which is made by means of one of the principles under consideration—this one being called triangulation. Its wedge-shaped platforms are ideal for shoes, but they lend themselves to the display of any product needing space and luxury in its presentation.

A dealer identification panel (not illustrated) appears to be a heavy, solid wall-plaque with three-dimensional letters standing up high upon the background. Each letter stands out about 10 times higher than the letters of an embossed sign. They are usually hung up in a prominent place and look like costly fixtures. Actually this panel is only a few pieces of light stock, flexed and tabbed into a background.

Each of the designs illustrated was created by the use of one of 7 principles of cardboard construction. With one flexing motion you can fold all the scores simultaneously because they are not single score lines, but are related, and they act as a "team of scores." These forms fold in *many* directions simultaneously, in contrast to the old straight-scoring which permits folding in *one* direction only.[1]

Perhaps the years to come will bring stage lighting, sound, and whole commercial playlets acted out in our windows. But that will not be this year, and I doubt that these will come next year. Meanwhile, here are several samples of the wonders of tomorrow—today. All you require is the paper and the board with which to fabricate them.

[1] Patented, but available through licensing arrangement.

The dealer factor in displays

by W. Kallenberg

In an effort to learn the dealers' viewpoint toward postwar point-of-sale displays, the writer recently made a survey in literally hundreds of dealer outlets throughout the states of Tennessee, Oklahoma, North Carolina, Illinois, Missouri, New Jersey, Massachusetts and New York. He spoke with homespun dealers in rural districts and small thriving towns; he questioned dealers operating in mushroom war defense areas; he interviewed alert, progressive dealers in large metropolitan areas. And he returned to his office with the conviction that the national advertiser will find a new dealer psychology confronting him when he resumes his display campaigns in dealer outlets.

Dealers (and there seem to be no exceptions), making more money than ever before, have developed a strong self-security and self-assertiveness. They recognize themselves as an important factor in the community, not merely a buffer or middleman between manufacturer and consumer. Out of this inner sense of assurance has emerged a wider vision, a confidence that they can give to and, therefore, can demand from the manufacturer better point-of-sale support. Dealers in the "B" and "C" classification burn with the desire to grow into "A" outlets. All see themselves progressing in their status, building toward a higher and more successful level in the retail world.

To further their aims 95% of the dealers interviewed said they were going to spend some of their money toward the redesigning of their store fronts and interiors. Questioned as to the type of display they would accept and feature prominently in their establishments, dealers stated: "They must blend with my new store interiors." "They must make my store look like an A outlet." "They must help dispense merchandise." "They must do something for me." Remarks like these left the writer with the feeling that displays which did not perform these functions would definitely not be put to practical use.

Some dealers had specific ideas and demands, varying according to the outlet.

The liquor stores and bars wanted units of dignity, but these had to be compact, made of quality materials, telling their story briefly and convincingly.

The delicatessen shops, with little display space, wanted an advertiser to be altruistic enough to feature not only his product but delicatessen specials as well.

Men's shops wanted dispensing units for counter use.

Soda fountains were looking forward to exciting new types of backbar units to key in with redesigned interiors.

Drug stores were hoping for distinguished backbar, counter and wall pieces to remove the stale look from their establishment.

And so on—leading into a wide field of postwar design, materials and construction. Advanced ideas on store architecture would play a part; the trend toward unified illumination would enter. But essentially, the call was for displays of dignity, stability, merit, function, new materials: practical units designed for a specific dealer purpose.

The subject of postwar dealer display needs is not new. It is something we in the display business have been contemplating for several years. The keynote of postwar advertising (and this of course includes displays) is a topic we have all given earnest thought. We have listened to lectures, read articles, and discussed the subject with artists, designers, architects and engineers. Today, the type of point-of-sale displays which will meet most satisfactorily the dealer demand as stated and attract the largest consumer market, are already crystallizing in the plans of national advertisers.

In order to see how closely some of the displays de-

1



1 & 2—Pride in the looks and smartness of his establishment is the rule rather than the exception with the retailer. He will accept and put to good and permanent use those pieces of "point-of-sale" advertising which he considers worthy of his place of business. "Back bar" fixtures, whether for hard liquors or soft drinks, must help to make the store look like a quality outlet. Photos, Kay Displays, Inc.



XUM

3—Long life and excellent service is guaranteed for this display which harmonizes with modern store fixtures. 4—This Heinz "Soup's On" dispenser, introduced several years ago, may still be seen in soda-foods dispensing outlets. Besides exhibiting the actual product, electrical fitments help prepare it for the consumer. Photos, Kay Displays, Inc.

signed and produced for national advertisers in the prewar era would approximate the need in postwar dealer outlets, the writer went through his files and came forth with a handful of photographs which are here illustrated. All of them he felt were sufficiently basic in the fundamentals of modern design to be acceptable in the postwar period; all were constructed of war-restricted materials, so that both the consumer and dealer would welcome them as signs of peace and postwar prosperity.

There had been a very successful unit made for one of the largest beverage companies in America, a fish and life-preserver ensemble made of wood and stamped metal, with accessories in rope, etc. The unit had received preference on the top backbar ledge over every other display piece that went into the soda fountain and candy store. Units of equal excellence and workmanship had preceded this unit, others had followed it.

Then there was the F. & A. M. Schaefer & Co.'s One Hundredth Anniversary plaque. Up and down the stores within the Schaefer territory, we had but a few weeks ago seen this unit, bright and fresh, still hanging after three years' consistent service when other displays had long since been discarded. The plaque was an individual tribute to the dealer; therein lay its secret of long life. The display was produced in finest grained walnut, on which was mounted a hand-engraved brass plate, with the name of each of Schaefer's thousands of dealers individually engraved upon it.

A functional three-piece unit had acted as silent salesman for Alexander Smith carpets. The large round center unit revolved on a turntable construction, with the carpet samples arranged in such a way that the customer could select his color and texture preference at a glance. Auxiliary units were two low stands on which carpet patterns and prices were displayed.

Just before the outbreak of the war, Heinz soups had become more firmly established in soda fountains and restaurant counters through the use of a "Soup's On" dispenser—a combination wood and metal unit, holding a variety of soups, heating cups complete with electrical unit, topped by a handsome wooden headpiece listing the soups. The H. J. Heinz Company had properly considered this one of the most successful display-dispensing units produced.

The next photograph showed a small Hiram Walker backbar unit. The display was made of light stained walnut, with the name "Canadian Club" appliqued in red plastic lettering. Metal fins extended from the plaque, top and bottom; silk cord was used for hanging. The long life of this unit proved that dealer displays do not necessarily have to be large in order to be good.

Another photograph recalled that some seven years ago Squibb & Sons had distributed a dealer display made of wood, metal and stamped metal. In our survey, we saw



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4

the unit on display in many drug stores throughout the country. Institutional in character and fundamental in design, this unit was frequently used by the druggist on the top ledge of the partition separating the prescription department from the drug counter, lending a professional dignity to the department as well as filling the awkward space occasioned by this type of store architecture.

In conclusion, there is this final factor to be considered: During the war years, brand identity plays a minor role alongside product availability. The customer, relying upon dealers' stocks, is taking the dealers' say-so about them. These elements have served to eradicate from consumer memory brand names, advertising symbols and the other insignia by which national advertisers have kept their product identity before their public in retail outlets.

That dealers will be a determining factor in the future point-of-sale techniques, vitally influencing the consumer attitude toward an advertiser's product, seems a self-evident conclusion. Newspaper, magazine, radio advertising can all fulfill their mission if the advertiser's point-of-sale material wins full postwar dealer support. It should not be too difficult to achieve, if sound principles are followed.

XUM

Jobs which displays can do

It is better advertising strategy to select one or two points and hammer them home forcefully. It is true that window display is an advertising medium which can be utilized for a number of purposes; but like every other medium, it simply can't do all of them at once.

What are the basic sales ideas which can be presented by means of window displays? "The starting point of display planning," as one point-of-purchase authority put it some years ago, "is a valid sales idea." The following list of nine specific objectives, with selling points of display emphasis classified under each for reference, is offered as a guide in production of accurately aimed point-of-purchase advertising, precisely planned.

1. *To gain attention:*
   - Use of dimensional effects.
   - Emphasis on sheer beauty and quality atmosphere, frequently with color.
   - Use of highly unusual, bizarre, spectacular effects—color, motion, lighting.
   - Life-size figures, human interest.
   - Bold poster treatment.
   - Exaggerated size packages or products.
   - Huge, mass effects by use of reproductions or actual packages or products.
   - Smart, humorous, "gag-line" type copy in conversation balloons.
   - Cartoons.
   - Reproducing packages or products in human figure forms.
   - Use of well-known, popular trade character.
   - Animal figures—cartoon-type, if appropriate.
   - Emphasis on trademark, slogan, testimonial line or letter.
2. *To use atmosphere as principal feature:*
   - Institutional story presentation.
   - History of company, product.
   - Celebration of an anniversary.
   - Presentation of story with scientific emphasis and color.
   - Building scientific background for product.
   - Use of humor.
   - Building quality atmosphere, appeal.
   - Developing holiday, seasonal appeal, background.
   - Style atmosphere.
   - Building gift theme.
   - Appetite appeal.
   - Sports background.
   - Economy, price, bargain appeal.
   - Specific group appeals—housewives, munitions workers, debutantes, secretaries, etc.
   - Illustrating product in home atmosphere.
   - Human interest.

1—Fixtures like this don't need copy—their convenience serves to establish and retain retailer good will. Photo, Monsanto Chemical Co.

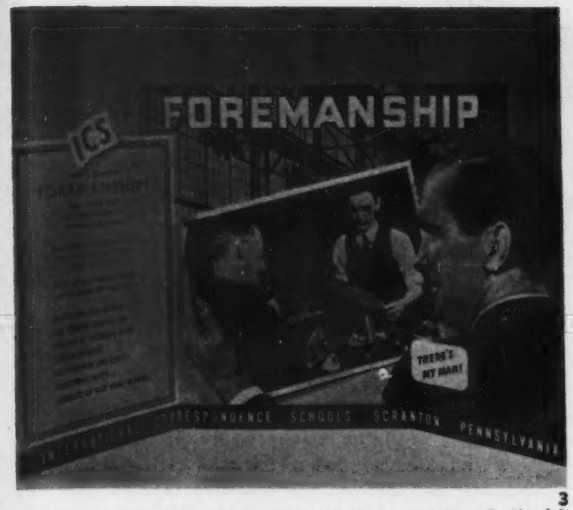
1



2—Using a well-known trade figure, this lithographic display creates an atmosphere of luxurious distinction. Photo, Eisen-Freeman Co.

2





3

3—Effective presentation of an intangible idea—ambition—is the job this display does. Photo, Brooklyn Plant, U. S. Printing & Litho. Co.

3. *To coordinate with advertising and merchandising:*
   - Tie-in with main advertising theme.
   - Coordination with magazine, newspaper, radio advertising.
   - Continuity of package color scheme in display.
   - Consumer contest tie-ins.
   - Premium offers.
   - Use of newspaper comic-strip advertising characters in display.
   - Use of screen, stage, radio, sports stars.
   - Tie-in with news events—local slants on national new happenings.
   - Coordination with special sales program—deals, etc.
4. *To help the consumer:*
   - Easier shopping with product dispensers—floor, wall, counter, table, etc.
   - Methods helping in correct selections.
   - Dispensing advertising material—educational.
   - Dispensing coupons, offers, contest announcements.
   - Dispensing samples.
   - Convenience in handling merchandise by permitting customer contact with products, materials.
   - Self-demonstration—offering customer something to do in action related to product.
   - Offering customer something to do with action unrelated to product.
   - Recipes, reminders, directions.
5. *To feature use of the product:*
   - Emphasize cost of product manufacture, operation, etc.
   - Bring out uses.
   - Illustrate how to use, possible varieties.
   - Suggest uses with other items.
   - Feature new uses.
   - "Before and after," dramatizations—benefits gained through use.
6. *To help the dealer:*
   - Cooperative sales activities—groups of manufacturers joining in sales plan.
   - Creating the departments to merchandise related items.
   - Promotion of the related item idea.
   - Helping improve appearance of retail outlets.
   - Supplying suitable, atmospheric backgrounds for seasons, occasions and products.
   - Improving dealers' services to customers.
   - Featuring prices of merchandise or services.
7. *To feature the product itself:*
   - Presenting new container frequently with old.
   - Display full line of products, actual or in reproduction.
   - Illustrate the product or package.
   - Feature actual product or package in display.
8. *To feature manufacturing aspects:*
   - Depict how product is made, processes, etc.
   - What product is made of, raw materials, etc.
   - Where product is made, factory, plant, shop, etc.
9. *To feature special sales points:*
   - Increasing sales unit.
   - Selling the product with related items.
   - Emphasis on full-line selling.
   - Selling necessary accessories with the product itself.
   - Suggest sale by illustrating actual sale in process.
   - Demontration of the product, supplementing work of demonstrators with display.
   - Featuring sales arguments in lists, summaries, etc.
   - Highlighting one sales point, dramatization, etc.

4—This counter unit actually exhibits the product, makes telling comparisons of photography with and without filters, shows examples of use.

4



Measuring display circulation

by Frederick L. Wertz

The interest in circulation possibilities of window display was probably never greater than it is today, although the present is a time when, quantitatively, that advertising medium has seldom been at a lower ebb. The advertiser himself, principally, is manifesting this interest in circulation; naturally his advertising agency and his lithographic suppliers are quick to note that interest on his part; with the result that all three—advertiser, agency and lithographer—are more ready and willing to consider scientific measurement of the medium.

As a matter of fact, this is, of course, the correct approach to appraising the value of any advertising medium. Some years ago, this simple definition was developed: "Circulation means the number of opportunities to deliver a sales impression." In newspapers and magazines, circulation represents the number of copies of each publication containing an advertisement that is acquired by the public, regardless of how many individuals turn the page and see the particular advertisement.

In outdoor posters and car cards, circulation represents the number of people who actually have an opportunity to see the poster or car card, without regard to the actual number who may look at a particular advertisement.

In window display, circulation is the number of people passing a display on the near-side sidewalk, with the opportunity to see the display. As in other media, whether or not they look at it does not enter into the circulation count.

In measuring circulation, several qualifications have been formulated, such as returned newstand copies, exchanges and sample circulation in the publication field, and in the poster field, distance and visibility.

When The Advertising Research Foundation established the yardstick for the measurement of window display circulation, they made the qualifications extremely severe, and limited the circulation to the number of people passing on the near-side sidewalk only, not counting automobile, street car, bus or far-side sidewalk circulation at all.

Due to varying sidewalk traffic conditions in different parts of a city, the exact measurement of window display circulation presented many difficulties. The detail involved makes it impractical to apply circulation figures to each individual location. The Advertising Research Foundation decided that the question of coverage of a market could not be separated from the circulation. In their report entitled *Window Display Circulation and Market Coverage—How to Select, How to Verify* is a complete explanation of the method by which circulation and coverage should be determined.

Checking the method

This method was checked, tested and verified in nineteen laboratory cities. Formulas developed from these tests have been re-checked in a considerable number of cities by our organization, within the last two years, and these formulas have been found ultra-conservative in every instance.

The Foundation's research disclosed that there was a definite minimum display quota required for coverage, varying for cities of varying sizes, and that comparative circulation was obtained by the use of minimum, normal, first and second intensity coverage.

By dividing each city into business districts, a definite pattern for the distribution of displays was set up and, based upon this return, circulation figures for the vary-



1—*This display meets a number of requirements: Shown in carefully selected locations to ensure maximum "circulation", it has the requisite beauty and interest to attract and hold the attention of the most casual passerby. Photo, Window Advertising, Inc.*



2



3

2 & 3—These displays have all the elements that make for success as sales helps: interesting seasonal appeal, clever tie-in with a current stage hit, professional installation for finished appearance in the window, "spotting" for planned coverage in strategic centers. Photo, Window Advertising, Inc.

ing intensities of display coverage were then determined.

For example, in Waterbury, Conn., with a population of 99,900, the minimum showing of displays would be 13. Normal coverage would be 26, first intensity 39 and second intensity 52. Actual counts showed that the minimum quota of displays developed a daily near-side sidewalk circulation equivalent to 25 per cent of the population of the city. Normal coverage, 26 displays, developed a daily circulation equal to 50 per cent, while the circulation for first intensity coverage, 39 displays, was 75 per cent. Second intensity coverage, 52 displays, showed the equivalent of 100 per cent of the population.

On the basis of a display remaining in a window only one week (although it is well known that most displays will average ten days to two weeks in a location) we would have a circulation for 13 displays properly distributed in Waterbury, Conn., of 172,000. Normal coverage would give a circulation of 344,000 first intensity coverage 516,000 and second intensity coverage 688,000.

Of course quotas vary for each city, and the circulation per display would be higher in larger cities and less in smaller cities. However, applying these formulas to a complete coverage of the United States, as represented by all cities with populations of 10,000 or more, and assuming that displays were properly distributed, we arrive at the following figures:

Total Population	58,323,271
Minimum Coverage	8,952 displays
	103,943,200 weekly circulation
Normal Coverage	18,904 displays
	207,866,400 weekly circulation
First Intensity Coverage	26,856 displays
	311,829,600 weekly circulation
Second Intensity Coverage	35,808 displays
	415,772,800 weekly circulation

While the resident population of the cities of over 10,000 is 58,323,271, the estimated trading population of these cities is somewhat more than 90,000,000. Therefore a window display campaign which included all of these cities would cover fully 75 per cent of the entire population of the United States and its impact must be a major one.

Near-side circulation only

The weekly circulation figures shown above are based on near-side sidewalk circulation only. Vehicular traffic, far-side sidewalk circulation and the fact that displays may remain up an average of ten days or two weeks are additional values.

These circulation figures are based on actual eighteen-hour daily counts in laboratory cities made by the National Window Display Research.

It will be seen, therefore, that there is a definite yardstick for the measurement of window display circulation, and this yardstick has the approval and authority of The Advertising Research Foundation of the Association of National Advertisers, Inc., and the American Association of Advertising Agencies.

A conservative yardstick

Every check that I have known to have been made since this yardstick was established has proved this measurement to be ultra-conservative.

It cannot be stated too often that window display is a reminder at the point-of-sale, where the opportunity is present for immediate action, so that properly planned displays compel the "circulation" to remember the product's advertising message. Window display is the best antidote to the "forgettin' man," whose lack of memory is probably the greatest single cause of loss in the effectiveness of advertising, for it is a constant reminder, greeting him at every turn.

Relating displays to other media

by Carl Percy

There is probably no other advertising medium which has demonstrated its ability to produce results when working alone as has window display. Conversely, there is probably no other medium so capable of supplementing and augmenting the results of other advertising as window display. Few will disagree with the premise that—where other media are used—window displays can profitably be coordinated with those media. The problem is to accomplish that coordination effectively. That is an interesting phase for the reason that it has many controversial aspects. The purpose of this article is to discuss some of the principles involved.

There are advertisers who regard displays as a link in the selling chain and they quite naturally stress the importance of coordinating this link with the other such as radio, magazine and newspaper advertising. In theory, this is a perfectly logical position to take. However, as it works out in practice, our discussion may prove that there are times when this position is awkward.

When an advertiser buys windows as a sop to dealers, or as a specific for salesmen's complaints, there is less likelihood of a serious attempt at coordination. This attitude toward display usually finds expression under the dignified characterization of "building dealer good will."

There is a very definite line of distinction between such "good will" types of displays and those which properly come under the general head of altruistic displays.

These displays sometimes assume the institutional character and build reputation for both dealer and advertiser. The direct sales type of altruistic display is a two-edged sword, doing its work of carving out results in two ways at the same time. On the one side it generally ties up with the national theme and thus may be considered as coordinated and, on the other hand, it helps the dealer to secure more profits than the one-product display permits.

The author has in mind two cases which point out the extremes in evaluation of displays. One, where the advertiser looks upon window display as his primary medium and supplements it with newspaper, radio and billboard advertising. This company does not have a complete national coverage, and the advertising must follow the channels of distribution. The other advertiser spends a great deal in magazines of general circulation, as an extensive radio program, and uses other media such as billboards, newspapers, etc., very sporadically.

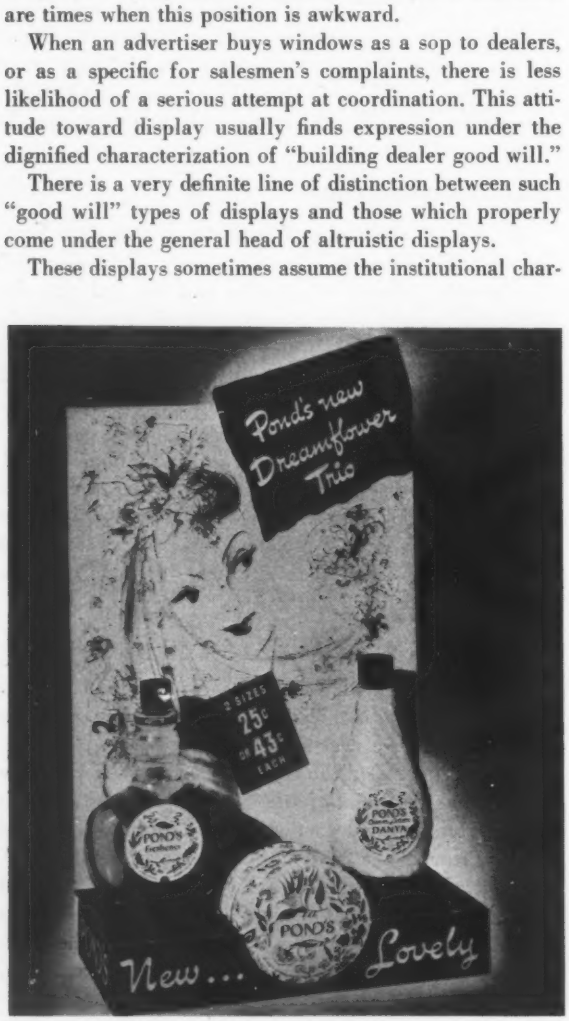
With window display, as with all advertising, the purpose is to sell merchandise to new customers and to keep old customers sold. It differs from other forms of advertising in that it must be shorter, bolder in treatment and easier to comprehend than, for instance, magazine advertising. It is not easy to lift illustrations and text from magazine advertising and make therefrom good window displays, so the coordination must confine itself to one or two of the main selling points.

As a rule, actual merchandise is shown with the window display and in this respect window advertising differs from all other forms. From observation covering many years in this field of advertising, the author would say that, by and large, the best displays give little outward evidence of definite coordination—that is to say, there is no pictorial similarity to the current magazine advertising and there is no attempt to follow the exact text of the advertisements. The notable exception to this is to be found in Chesterfield cigarette displays which often are based upon the themes of their space advertising.

That we may see that definite pictorial and copy coordination is not always indicated, let us go far afield and review some concrete cases. With a typewriter display, the object here is to follow through with a prospect on the basis of an invitation to come into the store and actually try the product. Such a sales device would be out of order in a product like shaving cream for which demonstrations, naturally, could not be offered.

In many cases the display is not the combat unit, but rather functions as a mopping-up patrol. This clincher action is illustrated in the G-E Mazda Lamp display.

Window displays often have been referred to as reminder advertising. The theory, presumably, is that na-



1—Advertisers may thank material shortages for the present tendency of retailers to hoard displays for re-use. This Pond's display, in tone and atmosphere, is keyed to themes used in national advertising.

tional advertising does the selling job and the display is for the purpose of refreshing the prospect's mind. In this case, it often happens that the only coordinating function which the display has to accomplish is to take some salient point from the national advertising and do a job of reiteration.

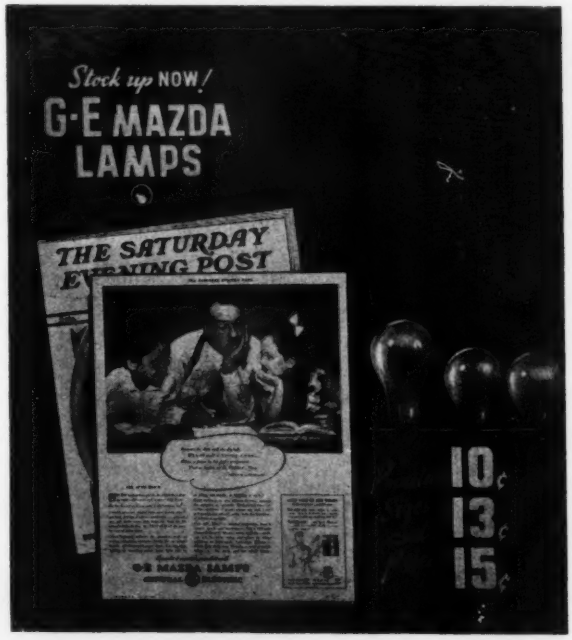
The pictorial device used to command attention is important, but to demand a dominant relationship between this and the pictorial content of the space advertising is unwise for two reasons. One, frequently the magazine illustration is not powerful enough for display purposes and it credits the consumer with vastly greater retentive powers than he possesses and, two, that in such an attempt the coordination is apt to produce a display which is not as powerful as it should be. Displays that are not attractive when considered apart from all other advertising are not apt to be acceptable to the retailers, and advertisers who insist on this relation will often defeat their own purposes.

Retailers who use displays supplied to them are not rank amateurs in appraising the "come on" value of a display. Theirs is the power of life or death over the offerings made to them and they certainly will judge display on its own merits and give little thought to coordination with other advertising. So it is that what seems so logical to the advertiser in theory does not always work out in practice.

If we return again to the point that window display may properly be called reminder advertising, then the longer that reminder stays where it can be viewed by the public, the greater return to the advertiser. In the case of the Mail Pouch Tobacco Co., there were two very definite obstacles from a creative standpoint. First, it is a product that under normal conditions the dealer would not naturally select for prominent display. Second, the character of the product precluded the possibility of any lengthy disputations revolving around the appetite angle. Displays have long been regarded by this company as a primary medium, and the only coordination considered desirable was to register product name in an agreeable manner at point of purchase where it would repeatedly be seen by the consumer.

There was created for this company a series of displays of historical and topical interest. Each trim was designed to make the dealer's window attractive to the public, to give them reader interest and only incidentally to sell

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3



2—General Electric displays often make the tie-up complete by reproducing in window displays actual advertisements that have appeared in publications. Photo, Carl Percy, Inc. 3—This display for window or counter is a miniature of the advertiser's outdoor posters—perfect link between two advertising media. Photo, Erie Plant, U. S. Printing & Litho. Co.

the product by the reminder value of the product name itself. These displays were painted in a high color key and reproduced in from eight to ten colors, thus enabling the company to get a longer, continued use of window space in the better stores.

Another good example of keeping the reminder before the buying public for a longer time by supplying the dealer with something attractive to his customers, and therefore acceptable to him, is to be found in the Eveready posters which may be characterized as purely human interest. When it comes to a question of coordination, it sometimes happens that the tail wags the dog. Eveready posters of the type in question had the same quality that so many of the better *Saturday Evening Post* covers have possessed. For this reason they were used by retailers for long periods of time and were found to be so effective that several of the better ones were used as full-page advertisements in color, in national magazines.

Many good altruistic displays have been created in the last 10 years; altruistic in the sense that they furnish a keynote for a window display which permits the use of related merchandise in the window. This can be done without losing the thread of the national appeal, as used in all forms of advertising. For years Ipana has been selling the "Smile of Beauty." One of their displays was consistent in that it stuck to this theme and yet it gives the dealer an opportunity logically to display cameras, films and developing services.

Regardless of what advertising men may theorize upon, the dealer knows that the display appeals to an audience that is on its feet and moving. It must be fast. This does not preclude the possibility of using enough copy to accomplish a sales job. In the main, however, the fast-acting poster qualities must be retained.

Swinging over to one of the extremes of this subject of coordination, we find the display functioning both as a reminder and as a device to sell another form of advertising. It is well known how the Gillette Safety Razor Co. has attempted to get increased following for their radio programs by displays designed to publicize them. After all, the radio is basically an instrument of entertainment. It is a good will builder. A display which accomplishes the dual purpose of reminding people of the product, and getting more listeners for the program, might be said to coordinate in the leading role. Because, relatively, displays are not costly, there is no reason for considering them of less importance. Anyone having any illusions as to the keen retail merchandiser's appraisal of value should try to get some space in one of the chain drug stores, for instance. Never has the opportunity to reach the public been so zealously guarded as the chain store merchandising men guard the space in their windows. The window is a primary medium because it reaches more people for less money, at a better place, than any other advertising medium. Perhaps sometime other advertising will be coordinated with window advertising; who knows? Unpredictable things have happened—even in displays!

4—Mail Pouch has long used store and window display as a primary medium which sounds the pitch for other media. Dealers still call for their displays illustrating important episodes in our history. Some dealers still feature the entire collection on their walls. Photo, Carl Percy, Inc.

4



Fitting displays to the sales spot

by Merle D. Penney

Just as a man's legs should be "long enough to reach the ground," so should a display's design, style, size, shape and message be sufficiently correct and complete to sell both dealer and shoppers. That is, the display must first successfully meet and overcome intense competition put up by other displays for valuable display space in the dealer's store; then, having won a valuable out-front selling position, it must increase sales of the sponsoring product by swaying consumers' desires, preferences and buying action to that product.

In considering this phase of point-of-purchase merchandising—fitting the display to the sales spot—we must deal with the word "fitting" in the broader sense of "to adapt or suit to a purpose," rather than the strictly mechanical considerations of the size of a display and the space which it will occupy.

Now, in adapting or suiting a specific display to the sales spot (the point of purchase), we are confronted with a number of factors which must influence the display's design and production. Some of these are: Type of product; objective of the display compaign; scope, whether regional or national; type of market to be reached, class or mass, nationalities involved, etc.; type of retail outlets, chain or independent, central shopping or neighborhood, high, medium or low grade. For instance, different classifications of retailers vary as to their desires and preferences with regard to display material. Chain store operators differ from proprietors of independents; druggists differ from grocers; and so on.

To aid in determining the correct essential features for fitting a display to the sales spot, a manufacturer or distributor has recourse to various sources of experiences and statistics. His own past experience is of prime importance, providing he has had sufficient upon which to base decisions. The past experiences of people in the same and allied lines, as recorded in his trade association, provide another gold mine of what to do, and what *not* to do. Then there are the surveys conducted by numerous organizations, usually recorded editorially in trade publications. Finally, he can have surveys of his own made, to determine the correct answers to questions that will arise as he undertakes plans for his point-of-purchase merchandising campaign.

The Point of Purchase Advertising Institute, Inc., has released some figures in recent months based on findings resulting from *prewar* surveys of retail grocers and druggists. These P.O.P.A.I. surveys were made in 450—500 stores in each classification, in various sections of the United States. They cover various phases of the use of displays by retailers, and include preferences of those retailers as to type and size. A couple of years before the war started, the Institute of Package Research conducted surveys among druggists, and the findings were published in the September and October, 1939 issues of MODERN PACKAGING. These I.P.R. findings recorded dealer preferences in the drug industry as to window displays, counter displays and floor displays.

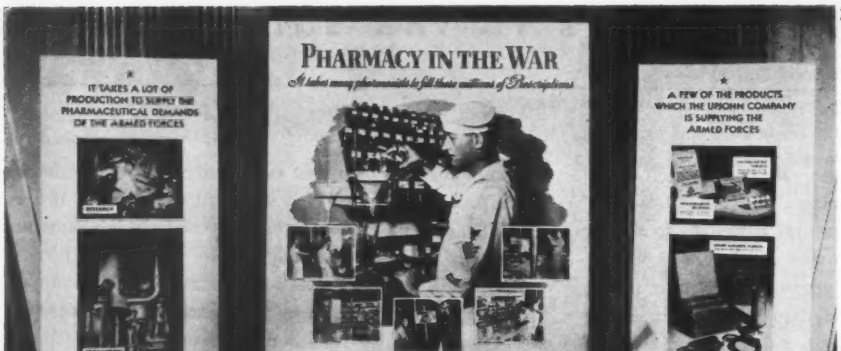
The sales spot (point of purchase) is the last link in the merchandising chain. It's the spot where the sales story has its final and decisive opportunity to influence purchasing action. From a display and merchandising standpoint, this sales spot can be broken down into three areas of operation:

1. The store window, which can be a vital magnet for



1

1—Though products and equipment are given space on the shelf of this display issued by Fred. Stearns & Co., no product is advertised in the panel. Caption: "Prescriptions filled for hay-fever relief" suggests professional diagnosis. The display is large enough and has enough carrying power to show up well in a window, but it is not too large to employ as a seasonal display on a counter inside the store. All photos in this article, Forbes Lithograph Manufacturing Co.



2

2—This Upjohn 3-piece window display is a wartime departure from a regular series. Here the pictorial matter highlights the grand job which is performed by pharmacists on the war fronts and various other phases of the war production of pharmaceuticals.

attracting window traffic and converting as much as possible of it into vital store traffic

2. The area on the floor and on the walls inside the store, where specially designed display material can be placed strategically for waiting shoppers
3. The counters inside the store, on which working displays present products within easy reach of shoppers for last minute impulse purchases

Window displays

In a consideration of window displays, we immediately are confronted with the question as to just what form it shall take to present most efficiently and effectively the product story to shoppers *on the move*. In some instances, a single large card may do a good job; in others, a set of three cards; in still others, a more comprehensive grouping of a large, dominant center piece with four or more side cards may be the answer. No hard and fast rule can be laid down. Decision must be guided by the factors enumerated above, with each of the factors carefully weighed in terms of other important considerations: The appropriation available for the display campaign; the size and type of stores which will carry the displays (here the physical measurements and number of windows available for display purposes will exert decisive influence on plans), and the type of industry. According to the P.O.P.A.I. surveys, in most sections of the country druggists are much more responsive to the larger and multipiece displays, while grocers seem to prefer single-card displays. If the display campaign is planned on an extensive basis with both large and small stores being called upon to present the display story, it may be advisable to follow the practice of a number of successful advertisers and have the display produced in more than one size; then distribute displays according to the size which seems most applicable to each type of store. Size and shape of the various window display pieces cannot be determined according to any rule. Past experience and recorded preferences of retailers, general practice and the type and scope of the specific sales story to be told must guide the ultimate decision. Displays for a jewelry store window, for instance, must be comparatively small and compact, and of a character to meet the physical limitations of size and appearance existing in a majority of such windows. Such displays would be lost, however, in many drug and other retail store windows.

Illustrations and copy on window displays must be developed with full cognizance of the speed with which the display must attract and focus attention upon the sales story, so as to get it across as the looker is passing. On the average, time is limited to the few seconds a person consumes in taking the seven steps necessary to pass the average store window.

Floor and wall displays

Once a person is inside the store, he or she becomes an active shopper and a potential customer. That person has entered the store to buy something. Because of that fact, he or she is fertile ground in which to plant a more detailed sales story than can be carried on a window display. This shopper, while awaiting an opportunity to get to the counter to be served, has time to investigate other items in the store and to absorb visual sales talks. These may be directed to the waiting shopper from wall posters or cards, back bar displays (festoons), pennants or banners; or from floor displays and island floor stands.

Illustrations and copy on these inside store display items can be much more leisurely in their story telling than can those on window displays. Speed is not so essential. There is time for pictures and copy to tell a more thorough and intimate story as to just what can be done with the product and what the product will do for the shopper. Appealing end results to be obtained by the use of the product can be portrayed and described, in color, by artistry and by photography, skillfully emphasized by form and layout.

Size and shape of these items, just as in the case of window displays, must be controlled by the scope of the campaign, type of market and retail outlets, product and economical sheet layout and production operations. Floor displays usually are made as near life-size as sheet layouts will permit, so as to permit those life-size floor displays to rub elbows with waiting shoppers and thus appeal to them on a more intimate basis. Back bar displays can be made in various sizes and shapes; and usually can be designed to be adjustable to the varying sizes of these back bar areas. Wall cards and posters can vary in size; economical printing sheet layouts will dictate size in many cases. Island displays for holding and displaying the product should be large enough and strong enough to support the product in an interesting display, which the merchant should always place so that it will be within convenient reaching distance of shoppers.

Counter displays

Counter displays are another, and very important, type of inside store display. The forms counter displays may take are many and varied. The following list comprises some of the more important of them:

1. *Counter display card*—Usually a square-cut or die-cut card, lithographed or printed, that stands on the counter—either by itself or in conjunction with a pile of the product packages. In many cases, it is a miniature of the main piece in the window display, making an ideal inside store tie-in with the window display story.
2. *Product selling card*—This is a lithographed or printed counter card having a quantity of the product packages attached to the face of the card in any one of a number of ways—with rubber bands, with metal clips, held by die-cut tabs, fitted into die-cut openings, etc. These product-selling cards reach the retailer filled with the merchandise, and are ready for instant placement on the counter. They go to work immediately, selling the product and making a good job of it.
3. *Product displays*—On this type of counter display, one or more of the product packages become an integral part of the display, with the design and construction of the display so developed that attention is focused at once upon the product package while the sales story gets across. Such displays can be amplified so as to hold and proffer descriptive booklets, folders, recipes or other give-away matter. A simulation of action can be created on this type of counter display, by constructing and designing the display so there is an illusion of the product pouring forth from the package, or some other apparent action, without undertaking the expense of mechanical action equipment.
4. *Jumble display basket*—In this type of counter display piece, the product is presented to the shoppers in a jumble display that invites inspection and self-service, particularly to those people who instinctively hesitate to disarrange an orderly array of product packages. The display basket usually is shipped to the retailer folded flat, in the shipping container that carries the product. The retailer then simply places the basket on the counter and quickly tosses in the product. Immediately, an inviting jumble display of the product is created, backed up by an attractive and convincing sales story on the display panels of the basket.
5. *Display container*—This is another popular type of counter display that has played in thousands of successful display and merchandising campaigns. It is a lithographed or printed cardboard container that usually reaches the retailer filled with the product. All he has to do is to raise the specially designed and die-cut display cover of the container into display position as he puts the container on the counter as

3



3—Four different Savogran products are featured in this counter display. Two of the cans rest on the shelf while the other two are held in die-cut openings at the base of the display.



4

4—Lithographed cutouts of Canada Dry bottles come 39 in. and 20 in. high. Larger appears in window while the smaller serves on the counter.



6

6—Effective floor stand for Knox gelatine holds supply of product out on the floor where waiting shoppers may absorb story, help themselves.

a display—complete with the product and a descriptive sales story.

6. *Novelty counter display*—Lithographed or printed counter displays can be so designed and constructed that some device is made a part of the display piece to give the shopper something to do—something to twist or move—that will center his attention on that display while awaiting service at the counter. During this time, of course, the selling message and illustration on that display have maximum opportunity to register and click.

Other variations of the types of counter displays outlined above can be developed, keying such development to the product itself, and to its intended market as well.

Permanent types of counter displays, too, find a place on the retailer's counter. Made of metal, wood, plastic or glass, they hold and display the product. However, a serious limitation is imposed by this type of counter display—the display is permanent, with the same appearance week after week, and month after month. The surprise and impact of change of pace, with new sales angles, is absent. Humans, on the whole, are very unobservant. They are inclined to accept constancy of appearance without really seeing it or noticing it particularly. They need a change of appearance, from time to time, to recapture their attention and revitalize their interest. Lithographed or printed paper and cardboard displays provide the most economical and practical means of dramatically effecting those changes.

On the counter displays, just as on the other inside store display material, the sales story can be more thorough and extensive than on the window displays, due to the fact that shoppers who are inside the store have more time to absorb that story.

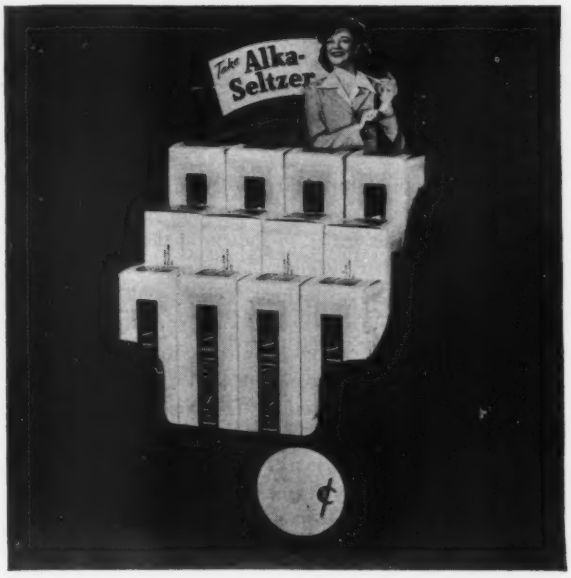
As to sizes and shapes of counter displays, here again many factors will have to govern. Retailers' preferences, as expressed in the I.P.R. survey and other similar surveys, must be taken into consideration as a number one factor; but the product, the campaign, the appropriation and the market all must be considered.

Here are some things to be kept constantly in mind as to the vital importance of the point of purchase, when planning and developing a merchandising campaign.

5—Multiple-piece window display for Schaeffer's Pens. Individual pieces are used inside in conjunction with window display or independently.

5





7

7—Display container which goes to the store filled with cartons of Alka-Seltzer ties in with pictorial matter used in a window display.



8

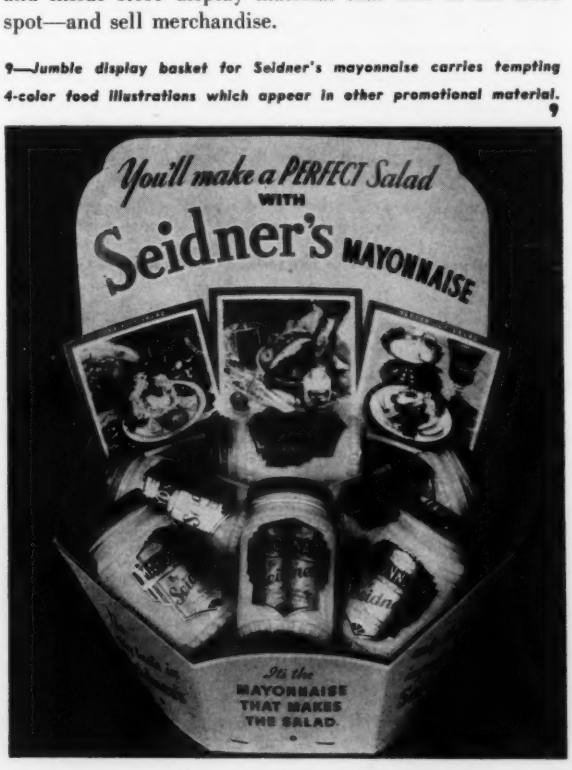
8—This Vicks inhaler product-selling card carried the product to the dealer in die-cut openings and tabs. It serves as a silent salesman.

1. Those areas directly in front of, and inside, the retail store provide you with your last opportunity to climax all your previous sales and merchandising effort with a final, on-the-sales-spot selling story that will maintain the urge to buy *your* product, even against competitive advertising also located at that spot where all of the consumer's final buying decisions are made.
2. The window display is an advertising medium that enjoys a cumulative value not equalled by any other kind of advertising. During a campaign, the same display is seen in window after window throughout the shopping areas of a town or city. Thus, the circulation and low cost of coverage enjoyed by the sales impressions of window displays is far beyond the comprehension of advertisers not thoroughly familiar with this phase of advertising.[1]
3. Shoppers who are inside the retail store are live prospects, indeed. They have entered that area in order to make a purchase, or several purchases. They are in a buying mood. It is an ideal moment, psychologically and strategically, for you to dramatize your product and to emphasize the things that your products can do for the shopper.
4. Generous use of color, in good taste and with a thorough appreciation of the dramatic value of color and design, is of prime importance on sales and advertising items employed in store windows, or on the floors, walls and counters inside the store.

Successful display advertising at the point of purchase is not a hit-or-miss proposition. A successful display campaign stems from a careful evaluation of all the factors set forth in this chapter, followed by intelligent sales thinking and professional creative design and development. That type of approach and operation promises the best in sales results. Furthermore, the experience of a good display producer who has grown with the changing marketing conditions of recent decades can be of tremendous help in organizing and producing store window and inside store display material that will fit the sales spot—and sell merchandise.

9—Jumble display basket for Seidner's mayonnaise carries tempting 4-color food illustrations which appear in other promotional material.

9



[1] For corroboration of this statement, see "Window display Circulation and Market Coverage," the published results of a national window Display research made for The Advertising Research Foundation of the Association of National Advertisers, Inc., and the American Association of Advertising Agencies.

Preparatory work

by Michael Gross*

The reason lithographed displays are looked upon as the "Orphan Annie" among the various mediums of publicity is just because the advertising man persists in passing the buck to the display salesman; who passes it on to his art department manager; who, in turn, passes it along to the first artist on his staff who has a leisure moment. That sequence always has made, and always will, for mediocrity —the greatest scourge from which window and store displays suffer. It just cannot be done that way—successfully. A certain amount of groundwork must first be cleared away and certain foundation stones properly laid. Disheartening though it may sound, it is up to you, Mr. Advertising Man, to see to it that this essential portion of the task is accomplished efficiently and effectively. And of all the ways to go about the job, wielding the pick and shovel yourself tops the list.

See a dozen or more of your representative dealers; merchants who have shown that they are alert for any plan to increase business. Talk to them frankly. Tell them you want to get up window and store material which will meet with their approval; which will reflect their view as to the best display to feature your product.

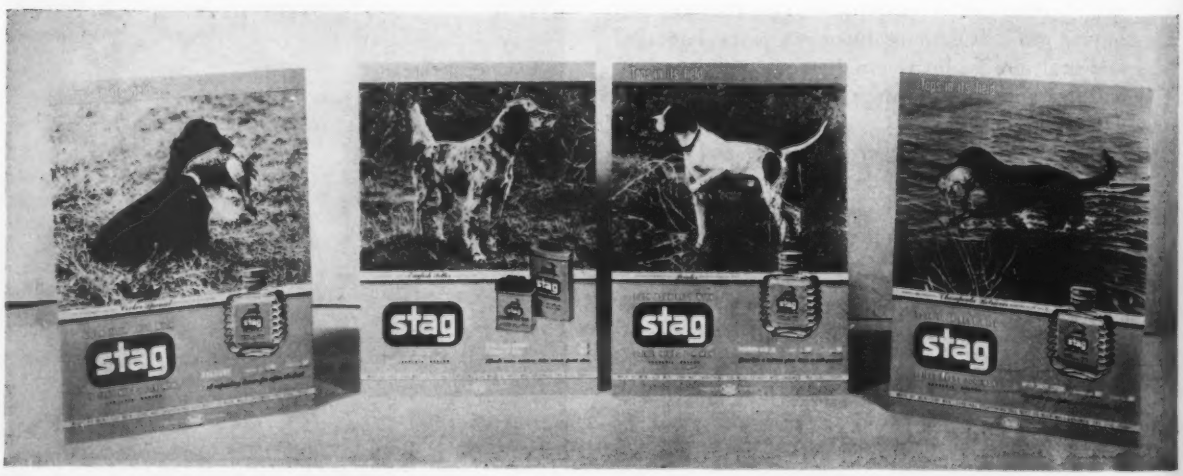
But bear one thing in mind. Merely outlining your plan and then asking these men what they think of it will invariably result in a verbal barrage of: "Great stuff!" and "Sounds fine to me!" which leads exactly nowhere. It may flatter your vanity to ask what lawyers call leading questions and thus be sure of receiving only affirmative answers—but these leading questions too often result in altogether misleading information. The dealer is only human and would always rather agree with you than cross you. Not only is it much easier but it certainly involves far less mental effort to approve a plan than to think up objections to it. A good way to get definite information without tipping off what you, yourself, have in mind, is to ask the dealer to show you the displays your competitors are distributing and then urge him to tell you what he finds wrong with them. You may discover, early in your investigations, that a product such as yours does not turn over fast enough, nor does it yield a healthy enough mark-up, to warrant the dealer giving anything but counter space to a display featuring it; or that the material he receives from your competitors is altogether too large for the importance of the item; or, worst fault of all, that these displays feature the wrong selling point. Perhaps you'll find, to your utter astonishment, that what the housewife demands in your type of product is utility, whereas most of the displays the dealer has been getting featured a beauty appeal. Or the reverse may be true.

You'll come back from even a two-day trip of this kind with more factually founded information about what the dealer wants in the way of display material than you could have gotten from a month of burning the midnight oil trying to figure it out for yourself. You'll have a new, and an accurate, conception of what size your new display should be; how it should be constructed; and what selling points it should feature to make the storekeeper like it well enough to put it in his window or on his counter. And he's either got to like it that much or he may just as well not like it at all. You can't win half a battle with a dealer.

Window and store displays must be aimed to the dealer —not through him. If he doesn't think the material you send him will help sell more goods, he'll junk it—nor will all your excited talk about the low order of dealer intelligence serve to cancel half a line of that inexorable fact. After all, it is the dealer's window and you are merely a guest, coming in only if you are given an invitation. One

* Reprinted in condensed form by permission of The Ronald Press Co. from "Dealer Display Advertising" by Michael Gross.

1 and 2—Preparation work on this series of cards demanded a knowledge of dogs, but full advantage is also taken of a well-known fact in display:



sure way of being invited is to stop thinking about your problems and your sales and begin to pay a little attention to the dealer's problems and his sales. Always keep uppermost in your mind the fact that you need the dealer far more than he needs you, despite all you may have heard about building up such an overwhelming call for your product that you will force the dealer to carry it, whether he wants to or not. (Of course, this generalization falls down during a wartime sellers' market.—*Ed.*)

The more time you spend finding out, from your dealer themselves, what they really want, and the less time you spend guessing what they want (or getting some display salesman to do the guessing for you), the more successful will your finished displays be and the more of your product will they sell.

But, important as it is to get this dealer viewpoint, the groundwork has not been fully laid when you have heard all he has to say. It is now necessary to do a little digging among your own salesman. Either in person at a sales conference, or by individual letters while they are on the road, every man on your sales force should be told that a window display is being planned and that any helpful suggestion he can give you will not only be appreciated but immediately acted upon.

While it may be true that the average "knight of the grip" understands very little about the mechanism of consumer-response or the psychology of perception, you must admit that he does get around. He talks with dealers every day, intimately and frankly. He can tell you if the storekeepers in his territory will give window space to a display featuring the line or whether they will use only counter cards. He has discovered, by asking the direct question, exactly where he will be allowed to put up a window streamer; arrange a floor pyramid; or tack a show card on a bare expanse of wall. And he won't be guessing when he tells you about it. He does know.

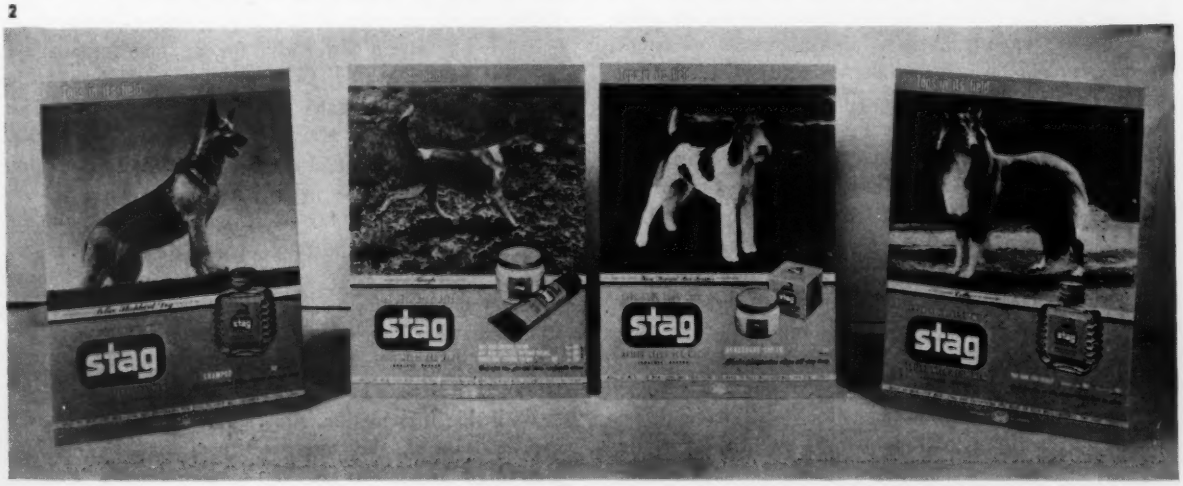
An advertising man will invariably come closer to producing a 100 per cent perfect piece of store advertising by listening to the advice of his dealers and salesmen than he will from the layouts he makes sitting in his office, or that the lithographer's representative brings around to him. Merely summarizing such information as he receives will, at least, give him a cue as to whether he wants a window cut-out or just a counter card; what the approximate size should be; whether the actual package should be featured or left off; and if the selling price is to be played up; subordinated, or eliminated altogether. The wrong guess on just a single one of these factors has doomed to failure many an edition of otherwise perfect displays. Don't make the mistake of thinking that the more designs you allow lithographers to submit, the greater will be the selection and the more apt will you be to find a perfect display idea.

Aside from the economic loss to the various lithographers (I have seen $1,200 worth of sketches submitted on an order that couldn't possibly amount to over $750) there was invariably an aftermath of squabbles and petty bickerings. As the same story has been told to each lithographer's salesman, and as not one of these men had anything in the way of an original thought to add to that story, it was only natural that the submitted sketches would bear some resemblance to each other. And, because these designs did look alike, a flood of charges would immediately break forth when the winning display was placed on view. "That fellow lifted my idea bodily," one of the losers would cry; "You stole the construction from the sketch I submitted," would wail another; "That way of holding the package was originated by us," would yell a third—and the advertising man would begin to toy with the idea of taking a header off the nearest pier.

In point of fact, this condition became so bad that it forced buyers of display materials to turn to their advertising agencies, have them prepare display sketches, and then ask a few of the leading lithographers to figure on reproducing them. But this didn't work out so well, and doesn't to this very day, for a very good reason. Advertising agency training is in one direction only: the preparing of material to appear in newspapers and magazines. All of this copy is planned for what is known as a "short throw" meaning that it must be definitely designed to be read about six inches from the eye. But a window

Animal pictures are a most potent device in display advertising for attracting attention. Photos, Brooklyn Plant, U. S. Printing & Litho. Co.

2





3

3—*Careful planning ensured a long life of service for this display.*

display, to be successful, must be conceived for a "long throw"—it has to get over its selling message six feet from the eye—and the technique of preparing such material differs radically from periodical advertising. Another difficulty an agency man is up against is that all his experience is in mediums possessing only two dimensions: length and breadth, whereas a show window has a third one, depth.

Well, here is how the modern advertising man finds a solution. First, he makes his own selection from among the lithographers who call on him. Secondly, he makes a habit of scanning the imprints on the really outstanding displays he sees about town. And, thirdly, he consults the display sections of the advertising magazines. Having discovered who the display specialists are, he gets in touch with not more than four of them, puts his problem before their representatives and asks for a few visuals from each. All he wants, please note, are rough sketch ideas—and that is all that is necessary.

There is no finer spur to a creative artist than letting him know he is pitting his ability against that of some rival display expert. There is also no better whetstone for an estimater's pencil than the knowledge that a couple of other lithographers are figuring on the same job.

And now you are finally ready to talk to the representatives of the lithographers who are going to work with you. Give them such basic information as to whether you want a window display, counter card, hanger or floor display; what type of store handles your product; whether or not you sell through jobbers; and what your plans are for distribution. There remains such secondary important questions as: "Are you going to ship the display with the merchandise?" If so, the salesman will want to know the size of your shipping container, so that he doesn't bring around a sketch which will have to be folded sixteen times to fit into it. Is the display to be shipped by itself? Then the size must be kept within parcel post limits, or you'll find yourself faced with a tremendous express bill.

Telling the salesman the few essential things he must know if he is to do a sensible job doesn't constitute, by any stretch of the imagination, furnishing him with an idea. You are merely fencing him in, so to speak, to keep him from wandering all over the lot. If you have consulted your dealers and salesmen, you are in the happy position of not having to ask the display salesman to guess. You tell him, intead.

Another thing the salesman will want to know is what quantity you were thinking of buying. Actually, the size of the order is furthest from the mind of the salesman when he asks that question. Although it rarely occurs to the man on the buying side of the desk, quantity does make a difference in the type of sketch to be submitted. If you want only a thousand cut-outs, the salesman knows he must caution the art manager to stay away from elaborate constructions, complicated die-cutting and designs that will take many colors to reproduce. The quantity is far too small to absorb the heavy initial cost of elaborate engravings and dies. On the other hand, if you have in mind to buy 10,000 three-piece, 28 in. by 44 in. screens, the art department can let itself go the limit, for now the run is large enough to completely absorb all of the cost of preparing the job.

Now comes the salesman's parting thrust—and it has started more arguments than anything else in his repertoire of interrogations. The fireworks usually start—although there is no real reason why they should—when he asks: "What do you expect to spend per display?"

There is one reason, and one reason only, that prompts the salesman to ask that question. He wants to know what artist to use and what type of display to submit that will come within the price limit you set. A certain artist, who specializes in just the very subject you want to feature on your display, may charge as much for one of his roughs as you have in mind to pay for the whole edition of finished cut-outs. How is the salesman to know that the assignment cannot be given to this particular artist unless you tell him what you have in mind to spend?

The best way to dispose of the price situation, fairly and tactfully, is in some such manner. Say to the man:

"In getting up your sketch, bear in mind that we can't possibly pay over a dollar each for ten thousand displays inserted in corrugated containers and sealed ready to ship. Of course, the more you can cut under this price and, at the same time, give us a real merchandising idea, the better will be your chance of getting the order. But, under no circumstances, will we go over a dollar a set."

Now let's see how far we've come. You've told the salesman the type of display for which you are in the market, based on your own knowledge of the definite dealer requirements; you've told him the quantity you want and what you have in mind to spend per display; you've told him how the material is to shipped and when the job will have to be delivered if he gets the order.

With this information, plus a few other questions he may ask, any display man worthy of the name will be glad to go the limit to give you sales-producing ideas.

XUM

Wood displays and cabinets

by Milton Weill

If one were to consider only the outlook of the immediate present, the future use of wood displays and cabinets would be exceedingly slim. Fortunately, however, the advertiser can look ahead to different conditions not too long hence; and the prospect for a return of competition means for a good many people the use of displays of a semi-permanent nature in merchandising their products. Designers and manufacturers of these materials are anticipating the needs of customers whom they have served in the past, and in many cases displays have been designed and are ready for manufacture just as soon as conditions permit. The time is now for planning and developing displays and merchandising pieces, to be ready for the situation when business practice resumes something that more nearly approaches normal.

When those normal times come, the silent salesman made of wood will again be an important means of introducing a new item, of re-introducing a product on which the sales have slowed down, of building good will. Now, when it is especially important for aggressive, farsighted merchandisers—who view problems from a long range point of view rather than from a short day-to-day restricted angle—to neglect no effort to keep their product and their name before the consuming public, the wooden salesman has an even bigger job. He has been especially useful as a constant reminder in keeping a product before the eyes of the consumer on retailers' counters, since displays—because of restrictions—are not being used to the same extent as formerly, and competition for consumers' attention is less keen.

One cosmetic manufacturer this year had the courage to work out a merchandising deal, as in past years, and the success of this effort was obvious from the start. Other manufacturers had planned their programs in advance and were therefore able to continue the use of displays which had always been such a fundamental part of their selling effort. This has been true even in those cases where the product was so widely in demand that it was no longer a selling problem but rather a manufacturing problem. In those cases, obviously, the display was used not to help in the actual sale but rather to keep the product prominently before the ultimate user. In that way, continued good will is created and either the advertised name of the product or the product itself is emphasized in the consumer's mind.

Farsighted manufacturers do continue to use displays, and in their creation and design they employ whatever materials are available. Many, particularly in the cigarette field, are now using wood in place of metal. Wood displays, because of their permanence, their relatively simple construction, and the variety they offer, continue to be requested more than any other type of constructed display. They are easy to build, and if so desired, it is possible to produce even a small quantity with no large initial investment in dies, for wood can be cut and shaped almost at will. Furthermore, all sorts of fancy shapes can be created in this medium.

In addition to their reminder value, wooden displays have other merchandising tasks to perform. Often, action and stunt devices built into the display urge the customer

1—This fixture assures permanent display, provides under-counter space, displays and protects goods above counter. Photo, Cluett, Peabody & Co.

1



2—Natural wood makes excellent background for jewelry, and convenient construction permits effective display. Photo, Arrow Manufacturing Co.

2



XUM



3

3—*Bourjois' counter-piece does team-work with an aggressive sales campaign, produces cumulative sales results. Photo, Arrow Manufacturing Co.*



4

4—*Above the wood base of this display is a good-looking transparent structure that keeps goods immaculate. Photo, Monsanto Chemical Co.*

to "try me," and effect a sale while the proprietor is busy elsewhere. Annoying delays are thus avoided. Therefore, storekeeper, jobber and manufacturer can well be enthusiastic over the fact that they may still use wooden display set-ups. Stock control though not as important as it once was—stock maintenance being more important —can also be aided by wooden containers which show, at a glance, just how many of any item have been sold.

Dealers have particularly welcomed displays because they help make up for the absence of merchandise with which to lay out windows or counters. Dealers, therefore, are all the more grateful for the cooperation of those manufacturers who continue to merchandise with the dealers' problem in mind.

New items—with the exception of military items—are not as numerous now, and the moving of dead goods is not a prime consideration today. Therefore, the sheer functional service performed by wooden displays is of paramount importance. The permanence of wooden displays makes it possible to refurbish them from time to time, even if they have been out of use for some time.

In the general wood field, natural wood finishes continue to be predominantly popular. While certain types of hardwood are difficult to obtain, they are nonetheless easier to come by than is metal. Once the quantity of wood required for any display has been secured, the matter of decoration is open to the same type of artistic ingenuity as in the past. As a matter of fact, beyond the restriction in the use of acetate for window effects, all other types of decorative materials are available. Screening as a method of imprinting an advertising message can be had, as can gold stamping, lacquer finishing, etc. And glass is still available for window effects.

In the jewelry and cosmetic fields where wood displays, combined with glass, velvet coverings, decorative ornamentations, lighting effects, etc., have been effectively used, such counter displays continue to be important factors in the development of merchandising plans. In many cases, of course, new products, new designs of old products or additions to the line can be introduced by the use of counter merchandise displays.

Jig-saw equipment has been employed to add a livelier effect to some wood counter displays. Often comic figurines made with the jig-saw have been used as part of a display in order to call more attention to the featured items and enliven the whole effect.

In many cases, cardboard combined with wood has served a useful display purpose. Mirrored displays continue to be popular. In some cases a mirror is merely incidental, in others it is the predominant note. It may have the practical value of drawing closer to the display the female customers who are interested in looking at themselves at the same time that they look at the merchandise being featured.

Despite the fact that some types of wood are difficult to obtain, generally speaking, wood displays are still available as an important aid in merchandising plans. Manufacturers may continue to look to this field for the effective display of their product on dealers' counters, displays which build good will and say, "remember me."

Displays will be lighted again

by George C. Kindred

In one of the recent reports about the German drive into Belgium during December, it was stated that of the equipment captured by the enemy, the most serious losses were tanks, trucks, and wire for communications. Copper in its pure and many alloyed forms plays a major role in every phase of warfare. In terms of wire alone, think of the miles of it which are used in each battleship, aircraft carrier, Flying Fortress or B-29. It accompanies every infantry and armored advance and its capture by the enemy is apparently still a serious loss.

This is one of the reasons that the War Production Board restricted the use of illuminated window displays early in the war. There were other reasons, of course, such as the need to conserve fuel, shortage of lamps, and restrictions on the use of elaborate cardboard constructions, but the critical position of copper was the most compelling. In the writer's opinion, there is very little likelihood of illumination being authorized until the peace treaties have actually been signed and sealed.

There is little doubt that illumination will again take an important place in the point-of-sale or display picture, however, and it might be profitable for the designers and manufacturers of displays to review the devices which have been used successfully in the past, with an eye toward the development of new postwar adaptations.

It is generally agreed that for the small extra cost involved the value of an ordinary lithographed cardboard display is enhanced many times by the clever use of illumination. The first function of a display is to attract the attention of the passerby. This is done by outstanding artwork, the startling use of color and design, the eye appeal of a pretty girl or an attractive child. and many other familiar devices. It has been proved conclusively, however, that motion added to any one of these makes a "sure fire" stopper. The cheapest, and perhaps most foolproof, form of motion is the manipulation of light.

Important to the advertiser is the fact that most dealers and storekeepers are also aware of the advantages of illumination and a high percentage of them will cooperate by going to the little additional trouble which might be required in setting up and plugging a lighting device. This is especially true at night when most store and window fixtures are turned off and the dealer realizes that for a minimum use of current he can maintain a focal point in his window which attracts notice not only to that particular product, but to his own store. Some years ago storekeepers had the mistaken notion that a light burning all night was very costly, but thanks to the educational programs of some of the large electric lamp manufacturers, they have been convinced that the current consumed costs only a few cents a day and that this cost is far more than outweighed by the advertising value of

1—Lampshade was simulated in a G.E. display by bowed-out parchment lit from behind. Photos in this article, Kindred, MacLean & Co., Inc.

1



2—Here a magnifying glass reveals the pattern of an Arrow shirt. A light, with flasher unit, calls attention to the pattern and open weave.

2





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3—Light in reflector at top plays up copy in prize Seagram display while colored flashing light illuminates background and windows. 4—A flashing light in reflector of this Eveready road sign lights text and picture.

illumination. It will probably be well to remind the dealer of this fact after the war. A label on the back of each illuminated display should emphasize the low cost of operation.

Before the war, great ingenuity was used in the design of lighting devices and some very striking and realistic effects were achieved. Unfortunately these do not show up well in black and white photographs and the illustrations reproduced with this article do not do justice to the actual appearance.

To review some of these devices, the oldest and perhaps most common was the two-plane display with a lamp between the two, casting a light on the background. On this type, as on all of the others to be mentioned, action could be provided by the use of a flasher socket. Then there was the familiar shadow box construction with the light reflected on the subject in the background.

Many realistic effects were achieved. For example, a bowed out lamp shade in which a light was used produced as telling an effect as an actual living room table lamp. Reflectors such as these used over framed paintings, bronze plaques or on roadside signs were also highly successful features.

In addition to plain reflected light, we had the highly interesting field of transparency. This was first accomplished by the simple pasting of a piece of onionskin or other thin paper over a die-cut opening with the light behind. As improvements came about in the mounting of displays, it was found possible to die cut the mountboard first and then to mount the lithographed sheet to register the desired image with the die-cut opening. This obviated the necessity of pasting tissue paper, as the lithographed sheet was found translucent enough to give sufficient illumination. Then it was found that a dark color printed on the back of the lithographed sheet would show through, thus giving a copy message or change of illustration when the light was flashed on and off. Flashers, incidentally, were so made that the intervals could be controlled and it was possible to hook up several lights, each flashing at different intervals in sequence or at random. One instance of a display which had more die-cut openings than solid board, presented a very real problem when it came to making the display stand rigid in the window. This display had four flashing lights operating in sequence.

Another natural development was the utilization of colored lights with the corresponding use of colored inks, based on the theory that an image can be neutralized by using a light of the same color and can be intensified by its complement.

The heat motor is a subject to which an entire article could be devoted and there seems to be no end to its possibilities as a display device. Water or liquid could be made to pour, clouds roll by, or waves dash on the shore. One display showed the entire inside mechanical operations of an electrical household appliance. When seen in operation it was hard to believe that one lamp and one acetate cylinder could accomplish all of the complicated actions which took place.

The past tense has been used throughout this article because these things are all familiar history. Concerning the postwar period, I am firmly convinced that once the WPB has given us the green light, there will be a great demand from advertisers for illuminated displays.

Corrugated display materials

by Paul Thompson

The war period, with its shortages and restrictions, has produced some interesting results in the field of window display. Principal benefit—for this era of denials and prohibitions has some benefits—is that display users have perforce had to make less go farther. As a result of these enforced lessons, the carry-over into peacetime will manifest itself in improved practices in the use of materials. When normal merchandising returns, it may be safely predicted that in point-of-sale advertising there will be a progressive development. This development will include the use of background material, which will undoubtedly be planned for a closer coordination with the display and its selling message. The trend toward smoother, less fussy backgrounds will continue, with a greater degree of factory fabrication to prevent loss in effectiveness when finally installed. Display corrugated will have a greater part in this program since it provides structural strength and three-dimensional color.

A rigid material shipped in rolls

A rigid, or semi-rigid material which can be shipped in rolls, display corrugated lends itself readily to the requirements of manufacturers' displays. The corrugating process converts lightweight papers into a material which has a one-way rigidity, which can be shipped in rolls. It is sufficiently rigid to stand erect when unrolled, requiring only the minimum of support.

Corrugated can also be converted into fully rigid panels by cutting a line across the corrugation along each edge of the roll, cutting through the corrugations but not touching the smooth surface, This forms a narrow panel on each side which, when folded back, makes the material fully rigid. While this cross-cutting can be done by the installation man, it is generally furnished cut to order by the manufacturer. This device enables material to be shipped in compact rolls and then transformed by the installer, with a minimum of bother, into a rigid display set or background.

Most advertisers are well acquainted with the principal type of color corrugated which utilizes the corrugating process for its three-dimensional beauty. The back of this material is smooth, while the face is made of colored paper, corrugated. This adds depth and form to the color, so that there is a continuous subtle pattern of highlights and shadows in the color. Most color corrugateds have corrugations ¼ in. in width, with newer types having convex or concave flutings, 1, 2 or 4 in. wide. Corrugations





Corrugated backgrounds lend adaptability to displays. (Right) In this arrangement for a large window the background was used to unify the small related articles which the lithographed pieces were designed to sell. (Above) Here, in a smaller window, the corrugated background brings the same lithographed material together in a unified single display. Photos, Window Advertising, Inc.

run the width of the roll, which may be up to 8 ft. wide.

Display corrugated may also use the corrugations only for their asset of rigidity, to support a smooth structural material that uses heavier stock for the facing. When unrolled, it has the appearance of composition board or solid panels. This has the advantage of easy shipping.

Display corrugated can be printed in a number of ways, either on the corrugations or on the smooth backing. The corrugated surface can be printed before corrugating, the design exaggerated when printed so that it condenses to its natural width when corrugated. The actual corrugated surface can also be processed by air-brushing.

The smooth surface of corrugated materials is becoming more widely used in its printed form. This can be done either by printing the rolls of paper before corrugating or by silk-screen processing after corrugating. Continuous roll process permits designs as wide as 60 in. repeating every 48 to 72 in. This allows the use of multiple-color, printed from three-color process.

While the silk-screen process is limited currently to application on sheets, this process is now being developed for continuous roll printing, to print directly.

The advertiser has a wide choice of materials and effects at his command. Display corrugated can be laminated with fabrics or crepe paper, and can be given special surface effects. These include "flocking" to give a velvety effect, "fluttering" with metallic or mica particles to give sparkle. Paper used in corrugating can also be embossed with novelty surface effects.

Display corrugated can be die-cut like cardboard in roll or sheet form. After die-cutting, the material can be shipped in roll form.

Methods of use

Backgrounds—Corrugated display papers are used most frequently for backgrounds, to provide settings for lithographed and merchandise displays. They provide an easy way to secure a change of background or to hide permanent window backgrounds. Corrugated can be easily cut with a pair of shears so that the installation man can readily make decorative effects.

In addition to the many standard color and construction corrugateds, the advertiser has available a wide range of accessory or design materials. These include die-cut effects like icicles and picket fences; or printed materials like clouds, trees, ocean waves, ice-blocks, woodgrains and flowers.

Columns or side-wings made of corrugated are often used to accentuate lithographed displays. Properly used, they can add height, width or depth to the display settings, are helpful in fitting the display to the window.

For displaying merchandise—Probably no other method is as widely used for displaying merchandise as the versatile pedestal made of corrugated. Through the use of inexpensive, pedestal cap sets, a range of sizes in round and oblong pedestals can be made in any height, possessing the advantage of a material that can be shipped in compact form and quickly installed to fit varying needs. Merchandise can be displayed on the face of the pedestal as well as the top, by fastening it to the corrugated or by inserting cut-outs in the corrugated. Other methods for displaying merchandise include ledges, special platforms, shadow-boxes, sloping floors and horizontal rolls; all of which are easily constructed due to the one-way rigidity of corrugated. These devices, too, can be cut by the installer, of furnished precut.

Complete displays—For the manufacturer who uses only limited quantities of displays, an economical answer is the complete display of corrugated, processed by silk screen or spray gun. In the central unit of a popular ice cream display, for example, a single piece of corrugated has been sprayed with a message, the columns being an integral part that provides the necessary support, thus being utilitarian as well as decorative.

Another answer to displays in limited quantities is the use of stock pictorials available through display manufacturers. These can be furnished with or without the advertiser's imprint. They are particularly desirable for use with suggested window setups for related-item or mass window displays, where the window is to be installed by the retailer.

Such pictorial and accessory materials represent the type of material normally bought by the retailer, so that he is well acquainted with its value. Since these suggested setups feature a variety of merchandise with maximum sales coverage, they stand a particularly good chance of being used.

Interior wall and ledge displays—Many stores make good use of wall areas for valances and ledge advertisements. These can be printed or processed in roll form with a corrugated backing that prevents sagging.

Methods used to buy and ship displays

Complete set-up to installation house or retailer—In this case, the display and materials are shipped complete, with detailed instructions to the installation house or the retailer. Assembling may be done by the advertiser, the lithographer or manufacturer of display materials. This method ensures complete control over each display, as the installation house or retailer receives the lithographed items, dummies and display materials together.

Drop shipments by display manufacturer—Most manufacturers of display materials will assemble and drop-ship these materials as ordered by the advertiser. This method relieves the advertiser of the detail of shipping and ensures that the installation house or retailer will have the correct material and will not be handicapped by shortages in local stocks. Like the first method, it ensures use of correct materials and colors.

Bought by installation house—Under this method, lithographed displays and dummies are shipped to the installation house together with complete instructions on the use of other materials which may be purchased locally.

Manufacturers' advisory service—Leading manufacturers of display materials maintain staffs of men who have graduated from installation work and know the answers to all the problems of display. They are well acquainted with all the technical processes used in the manufacture of displays and accessories, and are well equipped to render both advisory and creative service.

Crepe paper for displays

by C. E. Wright

It is a common practice, in many cities, to install window display in vacant stores, to take the curse of vacancy off and to give the impression of a busy district. But the lack of background is very disturbing to the observer who looks below the surface. No store proprietor who gives the matter any thought whatever would permit his windows to present such an appearance. He knows background material is indispensable.

But the background materials which have been so popular and so available in the past are today pretty hard to get because—these being papers of various kinds—they have gone the way of all scarce materials. Hence this discussion will deal with them as they will again be available. For purposes of display backgrounds, these papers may be plain, printed with stock designs, or printed special-to-order. They include the ever-popular crepe paper; plain or embossed metal foils; papers bearing designs to simulate leather, textiles or wood, or other patterns; flexible corrugated papers and some types of fancy box papers.

This multiplicity of background papers is most desirable. Variety is the essence of good display advertising as of any advertising. Accordingly, the aggressive manufacturers and the aggressive dealers familiarize themselves with all the wide range of papers, and use them to create constantly fresh and new decorative effects in window and other displays, always seeking the background papers that will do the job best. Many of the available materials combine very effectively—the less expensive crepes in their beautiful colors for large areas, the striking foils, flints, woods and leathers for accent—and the many types of corrugated papers for three-dimensional effects.

For timeliness—and every good display is timely—there are printed panels and borders, large enough to dominate the background and give the entire display the seasonal touch that can be relied on to sell merchandise. There are also seasonal borders, in continuous rolls of attractive design, to tie the entire interior of the store in with seasonal or holiday spirit.

Corrugated papers now are available in a wide variety of surface textures with novelty embossing and herringbone effects, and not only with the conventional small flutes, but also with very striking wide flutes of classic beauty and exceptional strength. Further, non-rigid background papers, such as crepe paper, can be laminated to corrugated board for an even greater variety.

From the wide range of materials and printed designs now available for displays even those retailers and manufacturers with the most limited requirements can create scenic effects that up to a few years ago were possible only to the very large department store or to the manufacturer who purchases display materials in large quantities. Similarly, the manufacturer who purchases display materials on a special-to-order basis today can command display effects of greater beauty and stronger sales punch than ever before.

The principles explaining the purposes and power of these many different background papers in advertising and selling, and the criteria governing the selection and use of them are the same for each of them. Therefore, it is practical to write about all of them in terms of a single one, for example, crepe paper. For crepe paper is familiar to everyone; it is extremely adaptable, that is, capable of yielding a wide variety of decorative effects.

Purpose of background

But first: "Why have these backgrounds?" The answer will apply not only to the backgrounds of displays, but also to valances, trims, and panels for all sorts of units, including windows, show cases, counters, demonstration tables, floor racks, wall areas, etc.

A satisfactory background will increase the effectiveness of a display because it:

1. Attracts attention, e.g., by providing color.
2. Ties in the merchandise or service being sold with the life of the prospective customers by creating an atmosphere that suggests the way to use or the place to use the product, and its origin or nature. This establishes a point of contact with the customer and suggests the purchase of the product to fill a need at Christmas time, on vacation, in the home, at the beach, or in any other timely manner.
3. Enlarges the unit of display by extending the lithographed card or the actual merchandise in such manner that it seems to fill the whole window or other display unit.

(Continued on next page)

1



1—Smaller displays, due to paper shortages, call for background materials to give windows a well-filled look. Photo, Window Advertising, Inc.

4. Focuses attention on the centerpiece—acts as a foil for the lithographed card or the merchandise.
5. Closes off the display from distractions which might otherwise divert the consumer's attention; for example, the background in a window shuts out movement in the interior of the store.

Desirable characteristics

To get results for which a good background is intended, the paper used should have as many as possible of the following characteristics:

1. *Color*—To attract attention, the colors should be striking, unusual. Also, there should be *a wide range* of colors; a well-known crepe paper manufacturer, for example, carries some 50 different colors in stock, which offer the decorator the opportunity for unusual and dramatic effects.
2. *Texture*—Not only color but also sheen or surface interest is another characteristic that a background paper should have. Foil papers have brilliance and a mirror-like quality useful on many occasions. Papers carrying wood, textile, leather or other designs are sometimes just the thing. Crepe papers offer a texture similar to expensive fabrics, and are reversible; that is, they show a satin-like sheen on one side, a dull, velvety texture on the other.
3. *Strength*—For ease of handling and permanence during life of display.
4. *Flexibility*—Also makes for ease in handling. To illustrate, visualize the manner in which a background paper like crepe can be used to wrap posts or other objects, turn corners, conform with or conceal an uneven surface, be compressed into a small space, or spread into a large one.
5. *Adaptability to many treatments*—This refers to special effects obtainable. Crepe paper, for example, can be pleated, draped, woven, and made into tubes; or it can be given a waved or rippled effect, and petal, fluted, or ruffled edges. Crepe can also be used to make fringes, nets, crushed festoons, Jacob's Ladders, lanterns, and decorative cut-out patterns as well as imitation plants and flowers of all kinds. This adaptability is a most desirable characteristic when it comes to creating an atmosphere to fit the product.
6. *Opacity*—Necessary to shut off outside interference which might otherwise disturb the onlooker. Crepe offers an advantage here in that it is opaque to vision, but translucent to light shining behind it. Also, this degree of translucency can be varied by the degree to which the crepe paper is stretched.
7. *Adjustability*—Because the windows vary in size, the background paper sent with a display must be so planned that it can be adapted to various sizes and shapes of windows. The stretchability of crepe suggests its advantages in this connection.
8. *Universal familiarity and availability*—Important points when considering distribution of window displays on a national scale. Crepe paper in its wide range of 50 colors is available in almost every city and town, enabling the retailer, or the manufacturer's installation man, to get materials with a minimum amount of trouble for adding to a window. When the manufacturer is asking the retailer to install the display, it is of immense help that almost everyone has some knowledge of how to work with crepe.
9. *Ease of installation*—The strength, flexibility, and stretchability of crepe paper make it especially easy to manipulate.
10. *Low cost*—This factor, along with the general availability of crepe, makes it a good material for national advertisers to use in displays having nation-wide circulation.

2—As if the picture itself were not enough to attract the envious eyes of passing males, the background materials have been skillfully used to lead all eyes to the main feature. Photo, Window Advertising, Inc.

2



Printed-to-order background paper

A background paper printed with the manufacturer's trademark or other identifying copy brings special added advantages.

1. It enables the manufacturer to tie in his display closely with his general advertising, the trademark on his product, letterhead, etc.
2. It makes for more attractive and more colorful displays because the background can be printed in special colors, to tie in with any theme color which the manufacturer may wish to feature.
3. Printed background papers provide an excellent means for creating just the right atmosphere to suit the product and the season of the year.

Finally, a retailer often changes only the merchandise or a lithographed card in a window and allows the background to remain—as almost everyone has observed many times. And, as long as a manufacturer's trademarked paper is left in the window, he continues to cash in on its benefits, even though the remainder of the display has been changed.

Plus values of the corrugated box

by Paul Meelfeld



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The corrugated box is a flexible merchandising tool, and in the hands of expert package engineers it offers manufacturers many merchandising values. More than that, because of its light weight, and its adaptability to many packaging problems, the corrugated box often produces savings in time, money, manpower and materials.

While the corrugated box has always had as its foremost objective the protection of the product, the other objectives which it achieves are also very important. These achievements merit high consideration from manufacturers looking for plus values in their packaging methods. A well engineered corrugated box makes the product easier to pack, easier to handle and ship, and to sell.

To substantiate this statement, let's discuss the values of the corrugated box as they relate to the three major steps in the merchandising chain—manufacturing, distribution and sale. First, we'll consider manufacturing, and because merchandising implies competition, let us assume that the manufacturer makes a product to sell under strong competitive conditions. While the value of the corrugated box is of course not limited to competitive products, competition does offer the corrugated box its greatest challenge.

The manufacturer using properly engineered corrugated boxes in which to pack, ship and store his merchandise gains positive protection for his product; saves time and money by expediting the handling of his product; and achieves these objectives while saving money over more expensive methods of packaging.

Next, how does the corrugated box aid distribution, the second step in the merchandising chain? The wholesaler

1—A perishable item finds complete protection in a corrugated box that is also an attractive display. 2—Retailers like to receive products in corrugated boxes that can be easily converted into sales-producing counter displays. 3—A highly serviceable corrugated box for cookies protects product in transit and promotes at point of sale. 4—Easily set up, this shipping-display box wins important counter space.

4



looks upon corrugated-packed merchandise with favor. While he appreciates the many sales advantages offered by the corrugated box, he also likes corrugated-packed merchandise because it is easier to handle, easier to store, easier to deliver in broken lots. Product identification makes possible a running inventory while the sealing technique used on corrugated boxes makes pilferage losses more obvious and therefore less likely.

In the retail store, the display possibilities which can be designed and built into a corrugated box come to attention immediately. Package engineers as revealed in many of the illustrations in this article, have created hundreds of corrugated boxes which can be transformed almost instantly into effective sales-producing displays.

The properly engineered corrugated box, designed for merchandising as well as protection, has only begun its work when it transports the product to the retailer. While ordinary boxes are thrown away, the corrugated box, designed to merchandise, carries the product direct to point of sale.

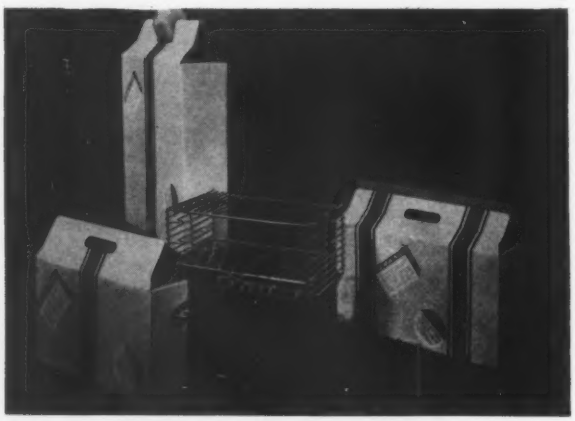
Since retailers haven't much time for complex displays, they prefer corrugated-packed products where sales display is "ready to go" the moment the product arrives. These boxes win valuable counter and floor space not only because they are attractive and easy to set up, but because they perform a real sales job. They display the product to the best possible advantage; they afford space for colorful and informative sales copy; and they often present single or multiple units, ready packed, for take-with purchases.

All along the line the corrugated box helps to deliver the product safely, to identify it, to make it easier to handle and to present it to the retail customers in an attention compelling manner.

The illustrations show several examples of modern merchandising with corrugated boxes. A brief description of each one is sufficient to demonstrate how expertly the corrugated box is engineered for the specific task.

5—Each unit is packed in a colorful luggage type box that serves the customer long after purchase. 6—Bulky electric wire is easy to handle and is clearly identified in attractive corrugated boxes. 7—A special package designed for a special sales event. 8—Shipping boxes become traveling billboards in transit. Photos, Hinde & Dauch Paper Co.

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Normal competitive merchandising takes advantage of this basic principle: When the consumer goes to the retail outlet to satisfy some realized desire, he or she is susceptible to many impressions created by product and package display in the windows and the interior arrangements of the store. Because of this, it is possible to induce additional purchases of goods for which the need or desire has not been previously realized.

Leaders in the scientific study of practical ways to utilize this principle are the modern supermarket, the syndicated "Five and Ten's" and the department store. Each of the three has its own peculiar problems and conditions, none of which could be considered interchangeable with the others' because each applies the principle in accordance with its own needs. From the discussions of these three types of outlets which follow, any merchandiser can draw ideas.

The syndicated store[1]

Despite all the dressing up of the "Five and Ten's" in recent years, they remain the department stores of the masses, and package design and display must be slanted to meet their peculiar problems.

The syndicate or variety store depends for its success on the offering of great varieties of low- and medium-priced merchandise—from toilet goods and notions to piece goods and ready-to-wear. This tremendous variety of merchandise is displayed by departments on open counters for customers to see, pick up, feel, handle and buy.

While higher-priced lines have been added to the original five- and ten-cent price range, the display principle remains roughly the same. Whether the item sells for five cents, ten cents or for one dollar, the customer knows she can walk into a syndicate store, look around, pick up anything she sees, feel it and put it back.

Before the war, syndicate store salesmen were gradually being trained to render more helpful service—a long step from the original conception of the salesgirl as a mere change maker and package wrapper. With the advent of the war, sales personnel in syndicate stores started to turn over rapidly.

This will change after the war, because the syndicate store is trading up with the masses. Better-looking and larger stores bring better quality merchandise and more variety in price lines. Higher prices require better display and more salesmanship. But just as these stores will always be known as the "Five and Ten's"—no matter what their top prices—so display will remain basically the same in most departments.

Although display is about the same in all variety syndicates—from F. W. Woolworth to J. J. Newberry, S. S. Kresge, G. C. Murphy, McLellan Stores, S. H. Kress, etc.—each company has its own little peculiarities or variations of the basic idea. All, however, divide their counter tops with glass partitions and wood shams. These divisions of the counter are important to the manufacturer designing a syndicate store product, because it is this closely packed, yet neatly grouped, type of display that makes correct package design so important.

The fact that these divided sections of each counter are usually variations of standard 4- and 8-in. units, suggests that packages and carded items should conform to these standard sizes. If they do not, consider this fair warning that the store managers will take matters into their own hands and clip off the sides or top of oversize cards, or cram oversized packages into counter space in such a way as to reduce its original display value. Many a supplier of this market who has been forced to adopt a new type, shape or size container as the result of the war, has discovered what happens to off-size packages that no longer fit or "nest" well in standard-size bins!

Another "must" when designing a syndicate store package is the urgent need for large, easily read lettering, plus clear, simple "how-to-use" illustrations. "Tell 'em everything on the package and keep it as simple as possible" might be a "Five and Ten" package designers' slogan. While this is suggested to facilitate customer purchases, note that the average salesgirl learns most of the facts about a product by reading the labels, instructions and other information.

Still another factor often overlooked in designing

1—Definite pattern of store traffic is given full consideration in the display of goods in large retail establishments. Photo, R. H. Macy & Co.



[1] Material for this section was especially prepared for the **Packaging Catalog** by Preston J. Beil, Editor, "The Syndicated Store Merchandiser."



2

2—The package itself, oftener than not, is the main feature of display within the store in the case of the modern supermarket. The customer roves about making selections usually from a list of wants. But items not on that list will also sell if package and display present an appeal strong enough to induce purchase. Photo, Owens - Illinois Glass Co.

variety store packages is the resale price. Even a casual stroll through a syndicate store will show the importance these retailers place on large and numerous price cards and signs. Obviously every packaged item should have its resale price marked clearly—in fact, boldly—on the face of the package. Also, since packages are displayed in mass—on counters as well as in window displays—they should be designed to get attention when grouped.

One last suggestion—the buyers and their associates in the executive offices of all the syndicates are glad to give any manufacturer advice on his contemplated package design. These men and women can easily be seen, and half an hour spent with several of them will prove extremely valuable in getting the right slant on your particular product. But be certain to see them *before* you spend your money on finished art work, costly plates, etc. Merely take a rough dummy package with you, plus a typed sheet of the copy you intend to include on the package. These men and women learned the variety store business the hard way—from the bottom up. They may not be professional designers, but they have a lot of common sense and know what makes "Five and Ten" packages sell. sense and know from long experience what makes "Five and Ten" packages sell.

The supermarket[2]

Aided by the close relationship with supermarket operators, resulting from McCall's Meal Planner Service for large, combination, self-service food and grocery markets, a limited test was made to evaluate some of the factors involved in competitive pricing and display of glass-packed foods under actual working conditions.

The principal value of this study lies in the fact that it is a signpost or roadmarker showing which way to go. There would be no point in detailing the actual results of this study now. The figures gathered then could not possibly establish hard and fast conclusions applicable today, for marketing conditions as they existed in January 1942 may not be at all typical of the postwar period. From this study, however, may be derived a blueprint which any manufacturer may use in plotting his own course. Concretely, the things that he would want to determine would fall into two classifications: first, consumer reactions; second, merchandising factors.

Under consumer reactions, he would want to learn, for instance, whether women feel that glass-packed food items generally are more desirable. He would want to know if there is an advantage from a sales point of view in seeing the product.

Under merchandising factors, the manufacturer would need to determine whether his particular products could be sold successfully, in volume, at a higher price than competing products in other types of containers. For his glass-packed foods, he would have to determine "the zone of reasonable pricing" in relation to volume sales and to the same or similar foods in other types of packages. He would also try to learn whether this "zone of reasonable pricing" were applicable to all glassed food items or whether such pricing must be determined for each individual item. He would be very much concerned with the types of merchandise displays most effective in moving glassed foods in volume, want to know whether such displays should be in combination with similar displays of the same foods in other containers or whether separate groupings of glassed foods should be displayed. He would learn what happens to sales of canned foods when the same foods are displayed simultaneously in glass.

From the point of view of the designer, the container manufacturer and the manufacturer of packaged consumer goods, it would appear that this type of approach should prove invaluable.

On the basis of the vast consumer-goods packaging job ahead during the postwar period and the relative dearth of valid data now available, it can be said that market research has barely scratched the surface.

It seems safe to predict, therefore, that more extensive and better marketing research in the field of packaging not only offers big sales, merchandising and advertising opportunities, but represents the top trend in postwar package planning.

[2] Material for this section was especially prepared for the **Packaging Catalog** by Research Division, The McCall Corp.

The department store[3]

Fifteen years ago, the problem of department-store display was indeed simple. Interest in dramatic backgrounds and props was completely unessential. A curtain or painted wall was all the adornment the rear of a good window needed. The display man was a glorified sardine-packer who jammed merchandise into a window with a science all his own. There was little demand for ingenuity. In those times of easy business, the merchant believed that the more goods he put in his windows, the more goods he sold. Business came easy, so he never worried too much about finding out whether or not his theory was really sound.

After the boom, the depression set in and taught the merchant some fundamentals of window display he never dreamed existed. With the drop in business came the need for greater sales stimuli to salvage his rapidly diminishing volume. When item-packed windows failed to produce, display men were asked to develop new techniques which would bring in some of the lost business. Fortunately for the display profession, many conditions that existed at the time worked in its favor. There were obstacles, to be sure, but the kind that were bound to bring out the best in display men or cause their complete collapse. Happily, these stimuli helped make display the art and science that it is today.

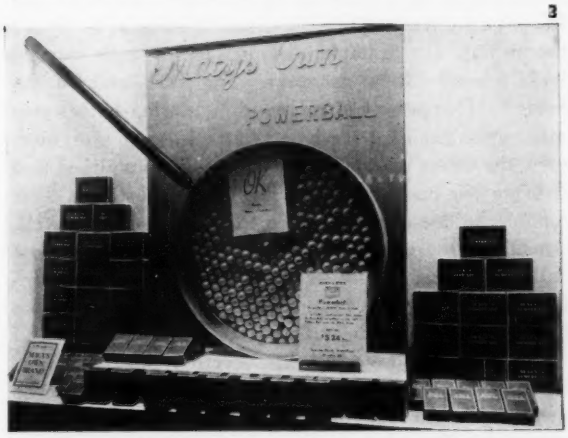
One of the first things a plummeting sales volume causes any business to do is slash expenses. And display budgets were quick to get the ax. That meant that display men had to start thinking about substitutes to replace the lush fabrics, costly metals and expensive materials they had been using during the "hang-the-expense" boom era. During this period, those ugly wax mannikins that adorned so many store windows melted right out of the picture. Their warranted lives were brief, because of their unpredictable reactions to atmospheric changes within the windows, and this rapid depreciation combined with their original cost made wax mannikins too rich for the blood of most retailers. Here was the perfect setting for progress. An entire profession was faced with a challenge. All its customary tools and techniques were being scrapped either because of expense or inefficacy. Display men had to rise to the occasion, and they were painfully aware of their need for all of the help they could get.

Because the depression had created a great surplus of workers and fewer jobs, many sculptors, artists, wood-carvers, stage designers, etc., turned to the display field for their livelihood or to supplement their dwindling incomes. Plaster and papier maché figures, heads, busts, forms and mannikins were soon being produced for a

[3] Material for this section was especially prepared for the **Packaging Catalog** by the Display Department, R. H. Macy & Co.

3—Department store windows exhibit stage techniques of lighting and arrangement. Photo, R. H. Macy & Co. 4—Counter height and slope in the syndicate store are so constructed that packages are given full chance to exert their own appeal. Photo, Syndicate Store Merchandiser.

3



4



greedy market. This same period saw the introduction of cork, corrugated paper, glass and plastics for use in the construction of economic props, fixtures, backgrounds and window settings. Stage designers were used to working with such varied materials and knew how to create dramatic settings with them. Color, which had been almost ignored as a display tool, was used with increasing success for dramatic, unifying and thematic purposes. Naturally, with the advent of new materials in the hands of new talent came a change in the face of windows. By constant experiment the new display profession was able to prove that windows were a very important vehicle of sales stimulus.

After much trial and error, they soon discovered that one item or one idea properly dramatized in a window really sold merchandise. With that realization, conglomeration of goods became the horrid examples of how *not* to sell merchandise through window display.

That did not mean that many items in one classification could not be displayed—such as housewares, notions, etc. But they could not be presented indiscriminately. There had to be a unifying theme to the window so that the passerby received one important message as he viewed the display. For example, a housewares window may be built around "Items to make your work easy in the home," "Things women cook with," "Spring housewares sale—everything for the home," etc. In each case, however, the theme of each window is highly simplified and delivers but one overall message to the customer. This same technique can be applied to ready-to-wear as well. Sometimes the one-idea rule means showing a window full of sky blue dresses, even though they may be in different styles. Or the keynote may be strapless evening gowns, with the colors and patterns varying.

Even merchandise which has very few inherent unifying promotional angles—for example, groceries—can be presented in the same mold. At Thanksgiving time, when the grocery department warrants a window, the focal point of the display becomes the holiday table, complete with celebrating family. No matter how impossible it may seem on the surface, experienced display men have found that one idea can always be extracted from any group of merchandise to serve as the unifying theme of a window.

To perform all these miracles with merchandise, new types of personnel were added to display-department staffs. Stylists, architects, lighting experts, artists who could paint dramatically realistic backgrounds and murals and a host of other specialists contributed their talents to this new art and science. They even developed techniques of dramatizing the highlighted item in a display with smaller, accessory merchandise. A dress would be featured with handbag, earrings, gloves, hat and shoes serving as the foils. In many cases, stores hired special copywriters to write window and interior-display signs. They recognized the need for provocative, straightforward, informative sign copy that could carry a message even though it was read on the run.

As display techniques were perfected and their value as sales-getters better recognized, interior display first started to come to life. Dramatizing merchandise at the actual point-of-sale was not unheard of, but it was a sadly neglected phase of most every store's promotional activities. The simple, effective techniques that made window displays so successful were easily adapted to showcase and backcase treatments. It was natural for interior displays to be tied in with the windows.

The man in charge of interiors would take his cues for props from the window decorators. A customer who saw a sea-horse as the main motif in a sun-and-play-clothes window, would find the same symbol repeated in the departmental displays. Such repetition served to focus the customer's mind on the item the department wished to highlight. Mrs. Consumer was drawn into the store by the window, and guided to the department and to the particular show-case from which the actual merchandise was sold by the interior displays.

If you recognize the basic principles behind proper display as we know it today, you can readily see why manufacturers turned their attention to the creation of better package designs and more dramatic package displays. They knew their goods would be displayed in windows, showcases, backcases and on the shelves of stores. Those packages that made the most dramatic displays would be sure to catch the display man's eye and be pushed into the foreground. The manufacturer could also feel that he was assuring the success of a window display when he had a well-designed package that would catch the consumer's eye. Because display at the point-of-sale (which is what interior display really is) showed such good results, manufacturers of soft goods even developed package display units. Sheet makers, towel concerns, jewelry houses and hosts of others devised counter-display units that capitalized to the fullest on the attention-getting principles of interior display.

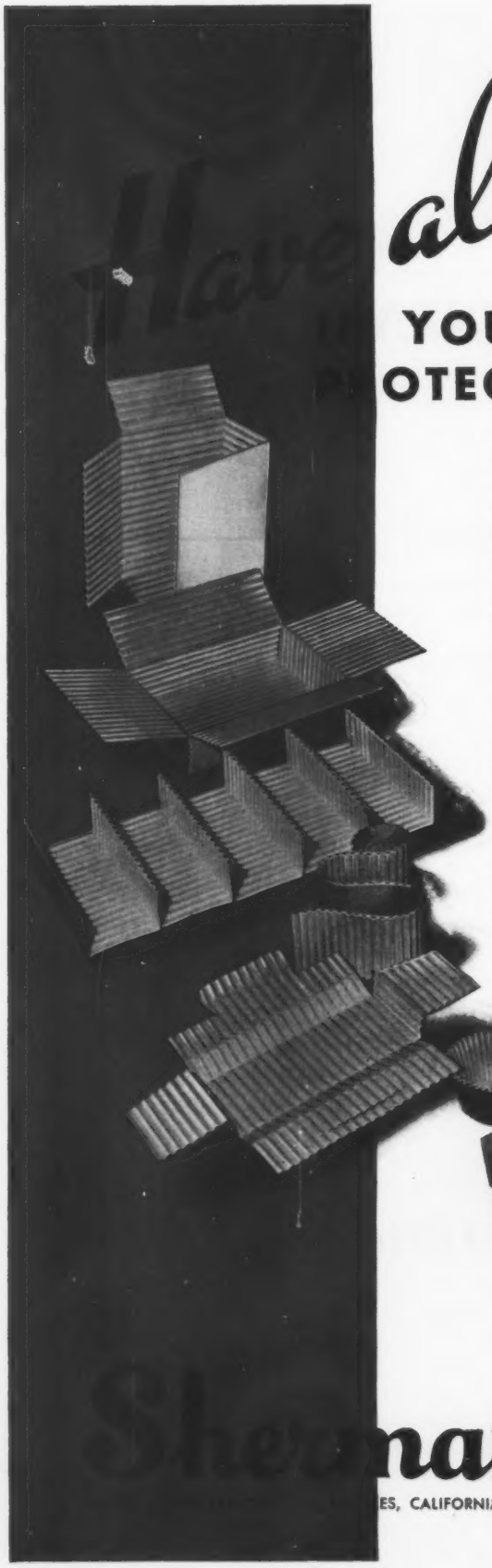
In summary, the few basic principles that should serve as a guide to those in department store display work are easily outlined. The first and most essential of all, whether you speak of windows, interiors, package design, or any of the other types of display, is attention. Unless the display attracts, it will never have a chance to deliver its message. By restricting the display to one idea, one theme, one item of merchandise, one hook to hang your hat on, you can most successfully attain that objective. Secondly, you must gain acceptance of the message by your customer by a simple, forceful message on the window or case sign and the proper use of dramatic props or backgrounds that lend authority, glamour and authenticity to the merchandise itself. As well as getting the customer's attention, any display must partially sell her on the item for sale, or at least cause her to investigate it further.

The alert display department and store will also recognize the institutional overtones inherent in a good display job. Windows and interiors may be essentially salesmen of goods, but in so far as their entertainment value, their ability to evince an appreciation for their artistic excellence on the part of the public and their opportunity to impress the store's customers with a job well done is concerned, this aspect of their functions in any store's promotional program cannot be too strongly emphasized.

ADVERTISING FOR...

MERCHANDISING

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all 3

YOUR PROTECTIVE PACKAGING

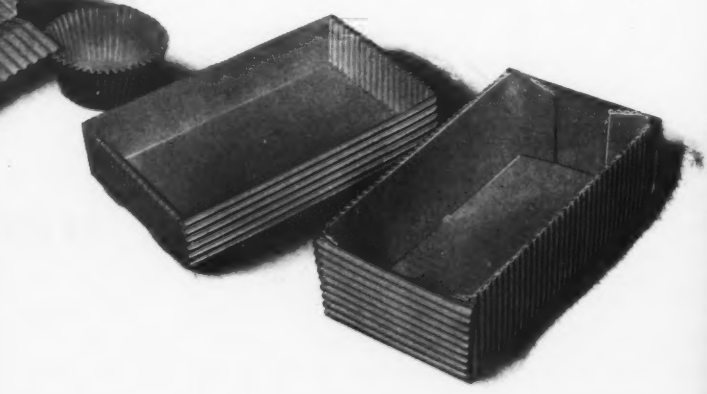
Competitive markets demand greater selling effort from every phase of packaging. You can have this extra sales appeal in your protective packaging by using Sherman products, for they meet all *three* important requirements:

PROTECTION Uniform corrugations . . . strong, clean fibres . . . good reasons for the greater safety and resiliency in Sherman Corrodek cushioning!

BEAUTY — COLOR Bright colors . . . sparkling whites . . . Sherman Corrodek cushioning, and packaging cups, provide the perfect setting to fit every product.

CLEANLINESS Clean, dust-free and litter-free, Sherman protective packaging products make no mess when your products are unpacked at point of use.

Have *all three* in your protective packaging! Let us send you working samples of Sherman Corrodek and packaging cups. Or, easier still, send samples of your products . . . we will return them promptly with protective packaging suggestions to fit their need. No cost or obligation, of course. Ask for them today, so that you may judge their extra sales appeal!



Sherman PAPER PRODUCTS CORPORATION

Newton Upper Falls 64, Massachusetts

ES, CALIFORNIA — *BRANCH WAREHOUSES IN* NEW YORK, CHICAGO, ATLANTA

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Beauty

MORE THAN SKIN DEEP...

There is much more to fine color reproduction than ink and paper. The radiant beauty of a lovely girl... the luscious goodness of an appetizing food serving... the detailed accuracy of a trade mark symbol... these reproductions don't "just happen" on a display or poster. Creative ability, technical skill, long experience... these are the factors that determine results in point-of-purchase advertising. These factors are assured when you use "U-S" service. For highest quality lithographed advertising materials... call on "U-S"

THE UNITED STATES PRINTING & LITHOGRAPH COMPANY

HOME OFFICE: 390 BEECH STREET, CINCINNATI 12, OHIO ★ SALES OFFICES IN PRINCIPAL CITIES

5 GREAT "U-S" PLANTS PRODUCING HIGHEST QUALITY ADVERTISING AND PACKAGING MATERIALS

XUM



Alert YOUR Trade-mark NOW ... For Postwar Competition

Wartime population shifts have been enormous. Population shifts mean shopper shifts. Similar migrations of buying power will take place during postwar reconversion. Keep YOUR trade-mark *alive*—on displays and posters at the POINT OF PURCHASE; on booklets and folders at the POINT OF USE. Items developed and produced by Forbes will be correct ... and fruitful.

FORBES LITHOGRAPH CO.

THE SHOP BY THE SEA

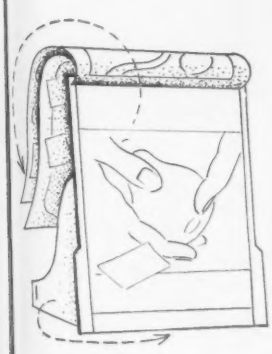
P. O. BOX 513 · BOSTON 2

NEW YORK CHICAGO CLEVELAND ROCHESTER

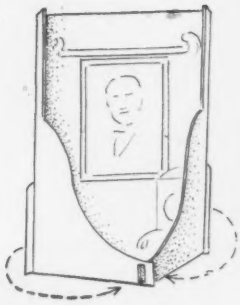
SIX DISPLAYS IN ONE

FOR WAR CONSERVATION





Here is a triple saving of critical materials—paper, board and shipping cartons. To our standard, patented, reversible display we have added two paper sheets—printed both sides. The result is six displays for this nationally known advertiser—General Electric Company. Outside of the important saving of critical materials, there is a corresponding saving to the customer in shipping and distribution costs.



Our production facilities are still largely occupied with important work for the United States Army and we are doing a minimum of commercial business. However, we would welcome an opportunity to discuss this interesting and economical display with you for future production.

CREATIVE LITHOGRAPHERS

KINDRED, MAC LEAN & CO., INC.

43-01 TWENTY-SECOND STREET
LONG ISLAND CITY • STillwell 4-7212
CHICAGO OFFICE • 450 EAST OHIO STREET

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From Peace *to WAR*



and Back Again

ORIGINATORS and MANUFACTURERS of DISPLAY MERCHANDISERS

Designed fundamentally for product identity and prominent display, specific dealer purpose, and making sales.

New manufacturing techniques achieved in the mass production of vital war material assures superior construction and display attractiveness. Send your display problems to us.

BUY MORE—BONDS!

ADVERTISING METAL DISPLAY CO.

WAR PRODUCTS DIVISION CHICAGO ILLINOIS

NEW YORK • DETROIT • MILWAUKEE

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IN WAR AND IN PEACE . . .

Ingenuity Sparks Our Counter-DISPLAY Attack



To-day, CHASPEC'S facilities are mostly devoted to war. We are proud of the contribution our specialized machinery, techniques and materials are making to the war effort. We are proud, too, of the ingenuity of our craftsmen who are producing unusual displays and merchandising units with unlimited eye and buy appeal. Yes, CHASPEC'S combination of creative 'know-how' plus specialized equipment can spark your counter-attack in war and in peace. Let us solve your next display problem.

CHASPEC'S UNIQUE MANUFACTURING FACILITIES

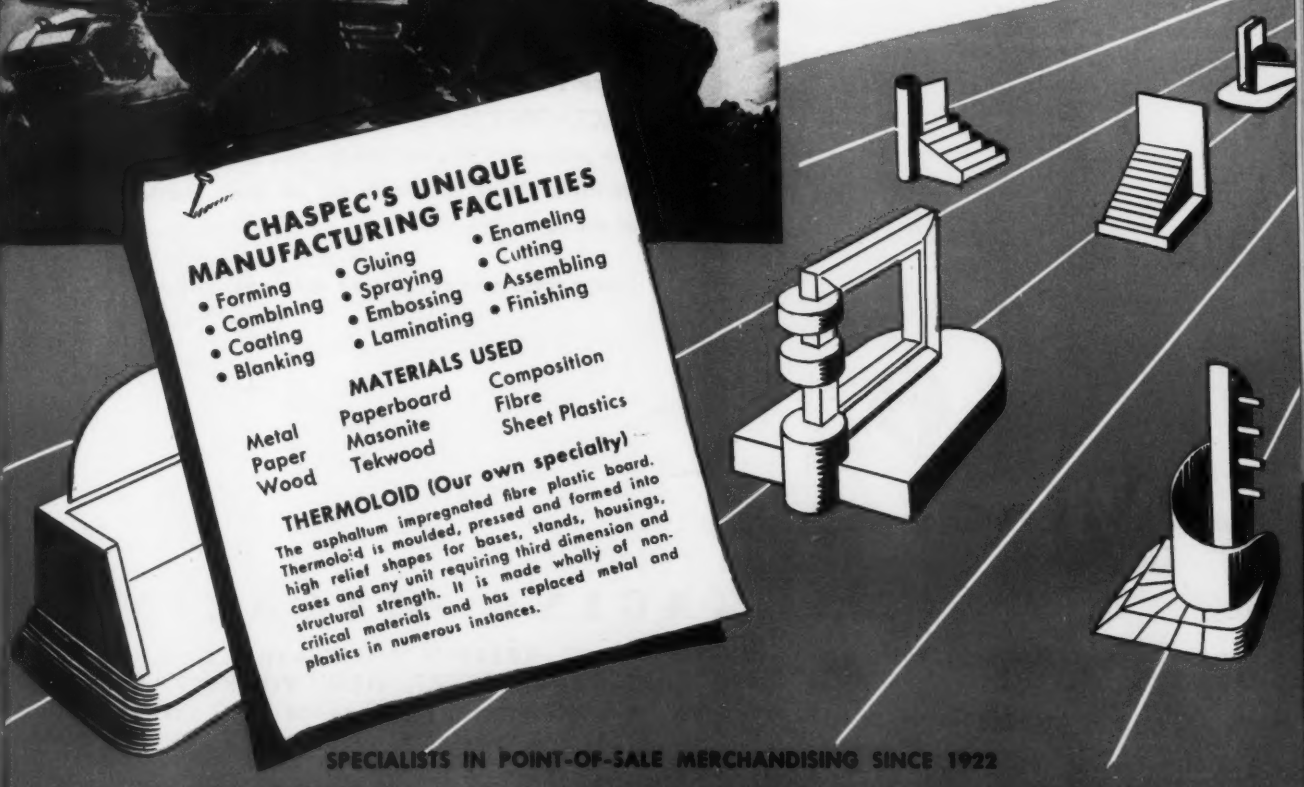
- Forming
- Combining
- Coating
- Blanking
- Gluing
- Spraying
- Embossing
- Laminating
- Enameling
- Cutting
- Assembling
- Finishing

MATERIALS USED

Metal
Paper
Wood
Paperboard
Masonite
Tekwood
Composition Fibre
Sheet Plastics

THERMOLOID (Our own specialty)

The asphaltum impregnated fibre plastic board. Thermoloid is moulded, pressed and formed into high relief shapes for bases, stands, housings, cases and any unit requiring third dimension and structural strength. It is made wholly of non-critical materials and has replaced metal and plastics in numerous instances.



SPECIALISTS IN POINT-OF-SALE MERCHANDISING SINCE 1922

CHASPEC MANUFACTURING CO.

295 LAFAYETTE STREET • NEW YORK 12, N. Y. • CA 6-0338

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Wanted: a medium for many markets

Packaging is not and never has been an industry.

It is, however, a function — the key function — in many leading industries. In foods, drugs, cosmetics and more than forty other fields, packaging uses the bulk of the machinery, consumes a large portion of the budget of the finished product.

MODERN PACKAGING was started to fill the requirements for a medium which would hold together the loosely-knit and far-flung interests of all packagers. It is designed to be read with equal profit by the packager of tools, as well as by the packagers of tooth brushes, perfumes and plasma.

Because the leading executives in all the packaging industries do read MODERN PACKAGING, it becomes, by the same token, a most important medium for advertisers. Through its advertising pages parade the leading products of all the suppliers; from cans to kegs . . . from fancy papers to moisture-proof containers. MODERN PACKAGING is the focal marketing point for the producers of everything used in packaging, enables them to reach all of their markets at once.

Space rates and circulation data on request.

MODERN PACKAGING MAGAZINE

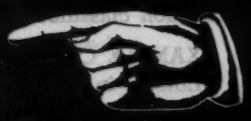
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122 EAST 42nd STREET, NEW YORK 17, N. Y.
Chicago • Washington • Cleveland • Los Angeles

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INDEX DIRECTORIES



Buyers' Directory
- Subject Index—Alphabetical 882
- Materials and Supplies Section 885
- Container Manufacturers Section 901
- Machinery and Equipment 913
- Services Section 920

Directory of Trade Names 926

Alphabetical List of Manufacturers and Addresses 945

Advertisers' Index 956













Buyers' Directory

FOR QUICK REFERENCE:—Principal feature of this Directory of the Packaging Industry is the four section classified list of products, services and suppliers. This has several new features.

EXAMPLE OF USE:—Suppose you are seeking sources for *closure liners*. Locate "Closures" or "Liners" in the Subject Index immediately below. Refer to the page given, on which will be listed a number of sources. Street addresses may be obtained by reference to page 945, "Alphabetical List of Manufacturers and Addresses." In all the lists, bold-face type indicates manufacturers whose advertising appears elsewhere in this book. From these advertisements additional information may be obtained about specific products or services.

Subject Index—Alphabetical

	Page
★Adhesives	885
Adhesives, Resin	885
Ampoules, Glass	901
Applicator Closures (see Closures, Applicator)	
Asphalt, Coating and Sealing	885
Associations, Trade and Educational	920
★Bag Ties	885
Bags, Anti-Tarnish (Cloth & Cotton-Lined Paper)	901
Bags, Combination	901
Bags, Foil	901
Bags, Glassine & Waxed	901
Bags, Glassine-Laminated & Duplex	902
Bags, Kraft, Grocery	902
Bags, Kraft-Lined	902
Bags, Multiwall, Heavy Duty	902
Bags, Open Mesh	902
Bags, Textile	902
Bags, Transparent (Cellulosic)	902
Bags, Waterproof	903
Bags, Window	903
Bottles, Aluminum	903
Bottles, Applied Color	903
Bottles, Beverage	903
Bottles, Food Packing	903
Bottles, Hand Made	903
Bottles, Milk	903
Bottles, Miniature	903
Bottles, Plastic	903
Bottles, Proprietary & Prescription	903
Bottles, Serum	903
Bottles, Toilet, Perfume, Cosmetic	903
Boxboard, Asphalt-Lined	885
Boxboard, Clay-Coated	885
Boxboard, Folding & Set-Up	885
Boxboard, Kraft, High Test	886
Boxboard, Metallic-Coated	886
Boxboard, Moistureproof & Greaseproof	886
Boxes & Baskets, Fruit & Vegetable	906
Boxes, Corrugated & Solid Fibre	904
Boxes, Corrugated & Solid Fibre with Wooden Frames	904
Boxes, Fancy Wood	904
Boxes, Leatherette	904
Boxes, Mailing	904
Boxes, Metal, Covered (Fabric, Leatherette, etc.)	905
Boxes, Metal Edge	905
Boxes, Metal Specialties (for Mascara, Cosmetics, Compacts, etc.)	905
Boxes, Paper Set-Up	905
Boxes, Tin Lithographed	906
Boxes, Wood, Covered (Fabric, Leatherette, etc.)	906
Brushes, Marking & Stenciling	886
★Caddies, Crackers	906
Can Sealing Compounds	886
Cans, Fibre	906
Cans, Fibre, Impregnated	906
Cans, Metal	906
Cans, Metal (Cellulose Window)	907
Cans, Paper (for Bulk Ice Cream)	907
Cans, Rigid, Transparent	907
Cartons, Can & Bottle Carriers	907
Cartons, Folding & Display	907
Cartons, Waxed & Paraffined	908
Closure Liners	886
Closure Sealing Compounds	886
Closures, Applicator (Glass, Rod, Brush, Dropper, Swab)	886
Closures, Atomizer & Spray	886
Closures, Bag (Thermoplastic)	886
Closures, Ceramic	886
Closures, Crown	886
Closures, Metal	887
Closures, Metal (Tamperproof)	887
Closures, Molded Plastic	887
Closures, Paper	887
Closures, Pouring Spout Type	887
Closures, Secondary-Caps & Bands (Cellulosic)	887
Closures, Secondary-Caps & Bands (Foil)	887
Closures, Supplementary (Bottle Applied)	887
Closures, for Vacuum Sealing	887
Closures, Wood	888
Coatings, Protective, Permanent (Bonding)	888
Coatings, Protective, Removable (Strip Type)	888
Compacts, Paper	908
Containers, Ceramic, Clay, Pottery (see Pottery Containers)	
Containers, Dehydrated Foods (Bulk)	908
Containers, Dehydrated Foods (Unit)	909
Containers, Frozen Foods (Bulk)	909
Containers, Frozen Foods (Unit)	909
Containers, Molded Pulp	909
Containers, Paper (Liquid-Holding)	909
Containers, Paper (Milk)	909
Containers, Paper (Nesting)	909
Containers, Rigid Transparent	910
Containers, Shipping, Weatherproof Fibre	910
Containers, Specialty Flexible	910
Containers, Veneer	910
Conveyors	913
Conveyors, Portable	913
Cord, Cellulose	888
Cork Sheets (Paper-Backed)	888
Corks	888
Corks, Aluminum Top	888
Corks, Molded Top	888

Corks, Wood Top 888
Crates, Wood & Plywood 910
Cups, Paper (Liquid-Holding) 910
Custom Packagers 920
★Decalcomania Transfers 888
Desiccants, Dehydrating Agents 888
Dies, Paper Cutting 913
Display Mounting & Finishing 920
Displays, Counter (Merchandising & Dispensing) 910
Displays, Floor Stand (Corrugated & Solid Fibre) 911
Displays, Metal, Sheet 911
Displays, Window & Counter 911
Displays, Wire 911
Droppers, Bottle 888
Drums, Fibre 911
Drums, Metal 911
Drums, Plywood 911
★Embossing, Custom 921
Embossing Rolls, Paper 913
Envelopes, Cloth & Cotton-Lined Paper 911
Envelopes, Merchandise Display 912
Envelopes, String & Button Closure 912
Envelopes, Transparent 912
Equipment, Materials Handling 913
Excelsior, Paper (see also Paper, Excelsior & Shredded) 888
★Filters 889
Finishing & Coating, Custom (Lacquers & Varnishes) 921
Flock 889
Flocking 921
Foil, Coated, Laminated, etc. 889
Foil, Metal (see also Paper, Foil) 889
★Glass, Rod & Tubing 889
Glues & Pastes (see Adhesives)
★Hammers & Tackers, Automatic Feed 913
★Inks, Marking & Stencil 889
Inks, Printing (All Types) 889
★Jars, Glass 912
Jars, Opal 912
★Labels, Foil 889
Labels, Heat Seal 889
Labels, Roll Type (for Shipping, Marking, etc.) 890
Labels, Roll Type (Heat Sealing) 890
Labels, Shipping 890
Labels, Stock 890
Labels, Transparent 890
Labels, Water-Resistant 890
Labels & Wrappers, Printed, Lithographed & Embossed 890
Laboratories, Research & Testing, Independent 921
Lacquers & Varnishes (see Coatings, Protective)
Laminating, Custom 921
Leatherette (see also Paper, Imitation Leather) 891
Liners, Bag, Barrel, Box & Case 891
Liners, Closure (see Closure Liners)
Lithographers 921
★Machines, Ampoule Filling & Sealing 913
Machines, Ampoule Washing 913
Machines, Bag & Envelope Closing & Sealing 913
Machines, Bag & Envelope Filling 914
Machines, Bag & Envelope Making 914
Machines, Bag Sewing 914
Machines, Bag Stapling 914
Machines, Banding & Wire Strapping 914
Machines, Bottle Cleaning (Air) 914
Machines, Bottle Cleaning (Washing) 914
Machines, Box Collapsing 914
Machines, Box Making (Set-Up) 914
Machines, Box Window Applying 914
Machines, Can Capping 914
Machines, Can Closing & Sealing 914
Machines, Can Filling, Liquid 914
Machines, Can Labeling 914
Machines, Can Wrapping 915
Machines, Cap & Cover Lining 915
Machines, Capping 915
Machines, Capsule Wrapping 915
Machines, Carton Forming, Lining, Filling, Folding, Closing & Sealing 915
Machines, Carton Loading (Cartoners) 915
Machines, Case Loading 915
Machines, Case Printing 915
Machines, Case Sealing (Glue) 915
Machines, Case Sealing (Gummed Tape) 915
Machines, Case Stitching 915
Machines, Case Unloading 915
Machines, Cellulose Tube Making 915
Machines, Coating (Lacquer and Varnish) 915
Machines, Coating (Wax and Hot Melt) 915
Machines, Collapsible Tube Filling & Sealing 915
Machines, Corking 915
Machines, Cotton Inserting 915
Machines, Counting 915
Machines, Crimping, Collapsible Tube 916
Machines, Crimping & Sealing 916
Machines, Crimping, Seaming Fibre Cans 916
Machines, Die Cutting 916
Machines, Doming (Boxes) 916
Machines, Embossing 916
Machines, Fibre Can Making 916
Machines, Filling, Dry (Gross & Net Weight) 916
Machines, Filling, Dry (Volumetric) 916
Machines, Filling, Liquid 916
Machines, Filling Semi-Liquid (Viscose) 916
Machines, Gummed Tape 916
Machines, Heat Sealing 916
Machines, Hooding 917
Machines, Label Gumming 917
Machines, Labelers 917
Machines, Labeling Attachments 917
Machines, Laminating 917
Machines, Marking (Box & Carton) 917
Machines, Metal Edge Staying 917
Machines, Numbering, Printing or Perforating 917
Machines, Packet Filling 917
Machines, Paper Bag Feeding, Opening, Weighing & Closing (Automatic) 917
Machines, Paper Roll Feeding 917
Machines, Paper Shredding 917
Machines, Partition Assembling 917
Machines, Preforming & Tabletting 918
Machines, Revenue Stamp 918
Machines, Rigid Transparent Fabricating (All Types) 918
Machines, Roll Leaf Stamping 918
Machines, Roll Slitters & Rewinders 918
Machines, Sheet Feeding 918
Machines, Sheeting 918
Machines, Spiral Wrapping 918
Machines, Spout Inserting 918
Machines, Stacking 918
Machines, Stapling 918
Machines, Static Eliminating 918
Machines, Stencil Cutting 918
Machines, Strip Combining (for Window Bags & Wrappers) 918
Machines, Tablet Counting & Packaging 918
Machines, Tape Dispensers 918
Machines, Tape Sealing 918
Machines, Tea Bag 918
Machines, Tight Wrapping (for Carton Shells) 918
Machines, Tube Lacquering, Varnishing & Printing 918
Machines, Tying 918
Machines, Unscrambling 918
Machines, Vibrators (for Packing & Settling) 918
Machines, Winding 919
Machines, Wire Stapling 919
Machines, Wire Stitching 919

Machines, Wrapping 919
Marking Equipment 919
Molders, Plastic 922
★Opening Tape (for Cellophane Packages) 892
★Package Design Consultants (Independent Organizations) 923
Packets 912
Padding & Wadding 892
Paper, Alkali-Proof 892
Paper, Anti-Tarnish 892
Paper, Cast Coated 892
Paper, Cloth Lined 892
Paper, Corrugated (Flexible, Wrapping & Packing) 892
Paper, Corrugated (for Window Trimming) 892
Paper, Crepe 892
Paper, Excelsior & Shredded 892
Paper, Fancy Printed or Embossed 893
Paper, Flint Glazed 893
Paper, Foil 893
Paper, Friction Glazed 893
Paper, Glassine (Plain & Embossed) 893
Paper, Greaseproof 893
Paper, Gummed 894
Paper, Heat Sealing 894
Paper, Imitation Foil 894
Paper, Imitation Leather 894
Paper, Impregnated 894
Paper, Kraft 895
Paper, Laminated 895
Paper, Mat- or Antique-Coated 895
Paper, Metallic-Coated (Plain & Embossed) 895
Paper, Mica-Coated 895
Paper, Moisture-Vapor Resistant 895
Paper, Non-Corrosive 896
Paper, Pyroxylin-Coated 896
Paper, Reinforced 896
Paper, Tissue 896
Paper, Trademarked 896
Paper, Vegetable Parchment 897
Paper, Velour (Plain, Printed & Embossed) 897
Paper, Waterproof 897
Paper, Waxed 897
Paper, Wet Strength 897
Paper, Wood Veneer (Imitation) 897
Paper, Wrapping (Fancy Tissue) 898
Partitions 898
Plastic Materials, Acrylate & Methacrylate 898
Plastic Materials, Allyl 898
Plastic Materials, Casein 898
Plastic Materials, Cast Phenolic 898
Plastic Materials, Cellulose Acetate 898
Plastic Materials, Cellulose Acetate Butyrate 898
Plastic Materials, Cellulose Nitrate (Pyroxylin) 898
Plastic Materials, Ethyl Cellulose 898
Plastic Materials, Melamine 898
Plastic Materials, Phenolic 898
Plastic Materials, Polyamide (Nylon) 898
Plastic Materials, Polyethylene 898
Plastic Materials, Styrene 898
Plastic Materials, Unsaturated-Polyester 898
Plastic Materials, Urea 898
Plastic Materials, Vinyl Alcohol 898
Plastic Materials, Vinyl Acetate 899
Plastic Materials, Vinyl Butyral 899
Plastic Materials, Vinyl Chloride 899
Plastic Materials, Vinyl Chloride Acetate 899
Plastic Materials, Vinylidene Chloride 899
Pottery Containers 912
Presses, Printing (Aniline) 919
Presses, Printing (Letterpress) 919
Presses, Printing (Lithographic) 919
Presses, Printing (Raised) 919
Presses, Printing (Rotogravure) 919
Printing on Glass, Plastics, etc. 924
★Ribbons & Ties, Cotton 899
Ribbons & Ties, Rayon 899
Ribbons & Ties, Transparent 899
Roll Leaf, Stamping Foil 899
Rubber, Sponge (Protective Wadding) 899
★Sample & Package Distribution 924
Scales, Automatic Check Weighers 919
Scales, Conveyor 919
Scales, Freight, Express (Computing) 919
Scales, Over & Under Weight 920
Scales, Weighing & Filling 920
Scales, Weight Printing 920
Seals (Embossed on Paper, Foil, etc.) (see also Closures, Secondary) 899
Sheeting, Transparent Rigid 899
Shipping Containers
(see Bags, Multiwall Heavy Duty)
(see Boxes, Corrugated & Solid Fibre)
(see Containers, Shipping, Weatherproof Fibre)
(see Drums, Fibre, Metal & Plywood)
Sprayers 920
Staples, Wire 899
Stencil Board (Oiled & Unoiled) 899
Stoppers, Rubber 899
Strapping, Fibre 899
Strapping, Steel 899
String, Printed (Plain & Decorative) 899
★Tags 899
Tanks, Heating & Dipping 920
Tape, Cellulose 900
Tape, Cotton 900
Tape, Gummed 900
Tape, Heat Sealing 900
Tape, Pressure Sensitive (Self-Sealing) 900
Tape, Water Resistant 900
Tape, Wire Reinforced 900
Testing Equipment 920
Tinplate 900
Transparent Films, Cellophane 900
Transparent Films, Cellulose Acetate 900
Transparent Films, Ethyl Cellulose 900
Transparent Films, Glassine (Lacquer-Coated) 900
Transparent Films, Latex for Wrapping Frozen Foods 900
Transparent Films, Polyethylene 900
Transparent Films, Rubber Hydrochloride 900
Transparent Films, Vinyl Acetate 900
Transparent Films, Vinyl Alcohol 900
Transparent Films, Vinyl Butyral 900
Transparent Films, Vinyl Chloride 900
Transparent Films, Vinyl Chloride Acetate 900
Transparent Films, Vinylidene Chloride 900
Transparent Materials, Converters of Rigid Cellulosic Sheet 924
Transparent Materials, Converters of Transparent Film 924
Tube Clips 900
Tubes, Collapsible (Aluminum, Lead, Tin & Alloys) 912
Tubes, Fibre 912
Tubes, Plastic 912
Tubing, Glass (see Glass, Rod & Tubing)
Tumblers (Glass) 912
★Varnishes & Lacquers (see Coatings, Protective)
Vials, Glass 913
Vials, Metal 913
Vials, Semi-Rigid Transparent 913
★Wadding (see Padding & Wadding)
Wax, Coating & Sealing 901
Wire, Reinforcement 901
Wire, Stapling 901
Wire, Stitching 901
Wire, Stitching, Colored 901
Wrappers (see Labels & Wrappers)
Wrappings 901

Materials and Supplies Section

ADHESIVES*

American Products Mfg. Co., New Orleans, La.
American Resinous Chemicals Corp., Peabody, Mass.
Arabol Mfg. Co., New York, N. Y.
Arvey Corp., Jersey City, N. J.
Atlas Powder Co., Zapon Div., Stamford, Conn., & N. Chicago, Ill.
Bakelite Corp., New York, N. Y.
Bingham Bros. Co., New York, N. Y.
Clark Stek-O Corp., Rochester, N. Y.
Commercial Paste Co., The, Columbus, Ohio
Dewey & Almy Chemical Co., Cambridge, Mass.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Findley, F. G., Co., The, Milwaukee, Wis.
George, P. D., Co., The, St. Louis, Mo.
Goodyear Tire & Rubber Co., The, Akron, Ohio
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Le Page's, Inc., Gloucester, Mass.
Makalot Corp., Boston, Mass.
Manhattan Paste & Glue Co., Inc., Bklyn, N. Y.
Marks Chemical Works, New York, N. Y.
Mid-States Gummed Paper Co., Chicago, Ill.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
National Adhesives, New York, N. Y.
National Casein Sales, Chicago, Ill.
Naugatuck Chemical, Div. U. S. Rubber Co., New York, N. Y.
Paisley Products, Inc., Chicago, Ill.
Philadelphia Quartz Co., Philadelphia, Pa.
Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio
Powers Products, Inc., Chicago, Ill.
Presstite Engineering Co., St. Louis, Mo.
Resinous Products & Chemical Co., The, Phila., Pa.
Stein, Hall & Co., Inc., New York, N. Y.
Sylvania Industrial Corp., New York, N. Y.
Synvar Corp., Wilmington, Del.
Union Paste Co., Hyde Park, Mass.
U. S. Adhesives Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.
Williamson Adhesives, Inc., Chicago, Ill.

ADHESIVES, RESIN*

American Cyanamid Co., Plastics Div., New York, N. Y.
American Products Mfg. Co., New Orleans, La.
American Resinous Chemicals Corp., Peabody, Mass.
Arabol Mfg. Co., New York, N. Y.
Arvey Corp., Jersey City, N. J.
Atlas Powder, Zapon Div., Stamford, Conn., & N. Chicago, Ill.
Bakelite Corp., New York, N. Y.
Bingham Bros. Co., New York, N. Y.
Catalin Corp., New York, N. Y.
Dewey & Almy Chemical Co., Cambridge, Mass.
Dow Chemical Co., The, Midland, Mich.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Durez Plastics & Chemicals, Inc., No. Tonawanda, N. Y.
Findley, F. G., Co., The, Milwaukee, Wis.
Flood & Conklin Mfg. Co., Newark, N. J.
General Electric Co., Plastics Div., Pittsfield, Mass.
George, P. D., Co., The, St. Louis, Mo.
Glyco Products Co., Inc., Bklyn, N. Y.
Gordon-Lacey Chemical Prods. Co., Maspeth, L. I., N. Y.
Hercules Powder Co., Inc., Wilmington, Del.
Interlake Chemical Corp., Cleveland, Ohio
Makalot Corp., Boston, Mass.
Manhattan Paste & Glue Co., Bklyn, N. Y.
Mid-States Gummed Paper Co., Chicago, Ill.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
National Adhesives, New York, N. Y.
National Casein Sales, Chicago, Ill.
Paisley Products, Inc., Chicago, Ill.
Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio
Powers Products, Inc., Chicago, Ill.
Reilly Tar & Chemical Corp., Indianapolis, Ind.
Resinous Products & Chemical Co., The, Phila., Pa.
Rohm & Haas Co., Phila., Pa.
Synvar Corp., Wilmington, Del.
Union Paste Co., Hyde Park, Mass.
United States Rubber Co., New York, N. Y.
Williamson Adhesives, Inc., Chicago, Ill.

APPLICATOR CLOSURES

(See Closures, Applicator)

ASPHALT, COATING & SEALING

Davison Chemical Corp., The, Baltimore, Md.
Presstite Engineering Co., St. Louis, Mo.

BAG TIES

Acme Steel Co., Chicago, Ill.
American-Natl. Bag & Burlap Co., Inc., Bklyn, N. Y.
Ames Bag Co., Cleveland, Ohio
Betner, Benj. C., Co., Devon, Pa.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Gump, B. F., Co., Chicago, Ill.
Paramount Paper Products Co., Inc., Phila., Pa.
Royal, Thomas M., & Co., Phila., Pa.
St. Regis Paper Co., New York, N. Y.
Walker Bag Co., Inc., Louisville, Ky.

BOXBOARD, ASPHALT-LINED

Butterfield-Barry Co., Inc., The, New York, N. Y.
Consolidated Paper Co., Monroe, Mich.
Empire Box Corp., Garfield, N. J.
Gair, Robert, Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Jaypaco Co., New York, N. Y.
Lowe Paper Co., Ridgefield, N. J.
Morris Paper Mills, Chicago, Ill.
National Water-Proofing Co., Camden, N. J.
Ohio Boxboard Co., The, Rittman, Ohio
Rexford Paper Co., Milwaukee, Wis.
Salwen, Joe, Paper Co., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Waldorf Paper Products Co., St. Paul, Minn.

BOXBOARD, CLAY-COATED

American Coating Mills, Inc., Elkhart, Ind.
Bradner Smith & Co., Chicago, Ill.
Butterfield-Barry Co., Inc., The, New York, N. Y.
Champion Paper & Fibre Co., The, Hamilton, Ohio
Container Corp. of America, Chicago, Ill.
Eddy Paper Corp., Chicago, Ill.
Gardner-Richardson Co., The, Middletown, Ohio
Jaypaco Co., New York, N. Y.
Lowe Paper Co., Ridgefield, N. J.
National Folding Box Co., New Haven, Conn.
Ross Paper Co., New York, N. Y.
Salwen, Joe, Paper Co., New York, N. Y.

BOXBOARD, FOLDING & SET-UP

Albia Box & Paper Co., Troy, N. Y.
Alton Box Board Co., Alton, Ill.
American Box Board Co., Grand Rapids, Mich.
American Coating Mills, Inc., Elkhart, Ind.
Andrews, O. B., Co., Chattanooga, Tenn.
Bird & Son, Inc., E. Walpole, Mass.
Butterfield-Barry Co., Inc., The, New York, N. Y.
Carolina Paper Board Corp., Charlotte, N. C.
Carthage Paper Makers, Inc., Carthage, N. Y.
Central Fibre Products Co., Chicago, Ill.
Chemical Paper Mfg. Co., Holyoke, Mass.
Chesapeake Paperboard Co., The, Baltimore, Md.
Columbia Box Board Mills, Inc., Chatham, N. Y.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago, Ill.
Continental Paper Co., Ridgefield Park, N. J.
Cornell Wood Products Co., Chicago, Ill.
Clifton Paper Board Co., Clifton, N. J.
Eddy Paper Corp., The, Chicago, Ill.
Empire Box Corp., Garfield, N. J.
Federal Paper Board Co., Inc., Bogota, N. J.
Fibreboard Products, Inc., San Francisco, Calif.
Fleming & Son, Inc., Dallas, Texas
Fort Orange Paper Co., Castleton-on-Hudson, N. Y.
Franklin Board & Paper Co., The, Franklin, Ohio
Gair, Robert, Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Hummel & Downing Co., Milwaukee, Wis.
Hummel-Ross Fibre Corp., Hopewell, Va.
Inland Container Corp., Indianapolis, Ind.
Jaypaco Co., New York, N. Y.
Lawless Bros. Paper Mills, Inc., E. Rochester, N. Y.
Liberty Paperboard Co., The, Steubenville, Ohio
Loroco Industries, Inc., Reading, Ohio
Lowe Paper Co., Ridgefield, N. J.
MacAndrews & Forbes Co., Camden, N. J.
MacSim Bar Paper Co., Otsego, Mich.
Manchester Board & Paper Co., Inc., Richmond, Va.
McEwan Bros., Inc., Whippany, N. J.
Marathon Corp., Menasha, Wis.
Michigan Carton Co., Battle Creek, Mich.
Mobile Paper Mill Co., Mobile, Ala.

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* Adhesives are usually formulated for specialized applications. This is particularly true of the newer resin adhesives. The user should consult the article, "What to Tell Your Adhesives Supplier," in PACKAGING CATALOG, and give full information as to requirements and conditions of use.

Addresses of companies listed appear on pages 945–955

Morris Paper Mills, Chicago, Ill.
Natick Box & Board Co., Natick, Mass.
National Metal Edge Box Co., Phila., Pa.
National Folding Box Co., New Haven, Conn.
Nelson, B. F., Mfg. Co., The, Minneapolis, Minn.
New Haven Pulp & Board Co., New Haven, Conn.
Newark Boxboard Co., Newark, N. J.
Ohio Boxboard Co., The, Rittman, Ohio
Ontonagon Fibre Corp., Ontonagon, Mich.
Queen City Paper Co., The, Akron, Ohio
Robertson Paper Box Co., Montville, Conn.
Rogers Paper Mfg. Co., The, Manchester, Conn.
Salwen, Joe, Paper Co., New York, N. Y.
Schmidt & Ault Paper Co., York, Pa.
Schmidt, Henry, & Bro., Inc., Phila., Pa.
Smeallie & Voorhees, Inc., Amsterdam, N. Y.
Southern Kraft Div., International Paper Co., New York, N. Y.
Strange, John, Paper Co., Menasha, Wis.
Sutherland Paper Co., Kalamazoo, Mich.
Tennessee Paper Mills, Chattanooga, Tenn.
Toronto Paper Mfg. Co., Toronto, Ohio
United Paperboard Co., New York, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.

BOXBOARD, KRAFT HIGH TEST

Butterfield-Barry Co., Inc., The, New York, N. Y.
Gair, Robert, Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
MacAndrews & Forbes Co., Camden, N. J.
Salwen, Joe, Paper Co., New York, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.

BOXBOARD, METALLIC-COATED

American Coating Mills, Inc., Elkhart, Ind.
Bradner Smith & Co., Chicago, Ill.
Butterfield-Barry Co., Inc., The, New York, N. Y.
Champion Paper & Fibre Co., The, Hamilton, Ohio
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Jaypaco Co., New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Lowe Paper Co., Ridgefield, N. J.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Miller Paper Co., New York, N. Y.
Salwen, Joe, Paper Co., New York, N. Y.

BOXBOARD, MOISTUREPROOF & GREASEPROOF

American Coating Mills, Inc., Elkhart, Ind.
Butterfield-Barry Co., Inc., The, New York, N. Y.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Columbia Box Board Mills, Inc., Chatham, N. Y.
Container Corp. of America, Chicago, Ill.
Gair, Robert, Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Inland Container Corp., Indianapolis, Ind.
Interstate Folding Box Co., Middletown, Ohio
Keller-Dorian Corp., New York, N. Y.
Lebanon Paper Box Co., Lebanon, Pa.
Loroco Industries, Inc., Reading, Ohio
Lowe Paper Co., Ridgefield, N. J.
MacAndrews & Forbes Co., Camden, N. J.
Marathon Corp., Menasha, Wis.
Michigan Carton Co., Battle Creek, Mich.
Morris Paper Mills, Chicago, Ill.
National Folding Box Co., New Haven, Conn.
National Metal Edge Box Co., Phila., Pa.
National Water-Proofing Co., Camden, N. J.
Ohio Boxboard Co., The, Rittman, Ohio
Salwen, Joe, Paper Co., New York, N. Y.
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Waldorf Paper Products Co., St. Paul, Minn.

BRUSHES, MARKING & STENCILING

Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Floquil Products, Inc., New York, N. Y.
Force, Wm. A., & Co., Inc., Bklyn, N. Y.
Gottscho, Adolph, Inc., New York, N. Y.
Noble & Westbrook Mfg. Co., The, E. Hartford, Conn.
Salwen, Joe, Paper Co., New York, N. Y.

CAN SEALING COMPOUNDS

Ams, Max, Machine Co., The, Bridgeport, Conn.
Babbitt Chemical Specialties Co., New York, N. Y.
Dewey & Almy Chemical Co., Cambridge, Mass.
Firestone Rubber & Latex Products Co., Fall River, Mass.
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Union Carbide & Carbon Corp., New York, N. Y.

CLOSURE LINERS

Aluminum Co. of America, Pittsburgh, Pa.
Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Bernardin Bottle Cap Co., Inc., Evansville, Ind.
Bond Crown & Cork Co., Div. of Continental Can Co., Inc., Wilmington, Del.
Carbide & Carbon Chemicals Corp., Plastics Div., New York, N. Y.
Columbia Specialty Co., Inc., Baltimore, Md.
Dewey & Almy Chemical Co., Cambridge, Mass.
Disbrow Mfg. Co., Newark, N. J.
Dobeckmun Co., The, Cleveland, Ohio
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Dodge Cork Co., Inc., Lancaster, Pa.
General Felt Products, Inc., Bklyn, N. Y.
Gutmann, Ferdinand, & Co., Bklyn, N. Y.
Irvington Varnish & Insulator Co., Irvington, N. J.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Matthias Paper Corp., Phila., Pa.
Mehl Mfg. Co., Cincinnati, Ohio
Mundet Cork Corp., Closure Div., Bklyn, N. Y.
Pollock Paper & Box Co., Dallas, Texas
Shellmar Products Co., Mt. Vernon, O.
Standard Insulation Co., E. Rutherford, N. J.
Traver, Corp., Chicago, Ill.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Union Carbide & Carbon Corp., New York, N. Y.
United States Rubber Co., New York, N. Y.

CLOSURE SEALING COMPOUNDS

American Resinous Chemicals Corp., Peabody, Mass.
Ams, Max, Machine Co., Bridgeport, Conn.
Davison Chemical Corp., The, Baltimore, Md.
Dewey & Almy Chemical Co., Cambridge, Mass.
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Naugatuck Chemical Div. of U. S. Rubber Co., New York, N. Y.
Paisley Products, Inc., Chicago, Ill.
Pyroxylin Products, Inc., Chicago, Ill.
Stokes, F. J., Machine Co., Phila., Pa.

CLOSURES, APPLICATOR

(Glass, Rod, Brush, Dropper, Swab)

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Brockway Glass Co., Inc., Brockway, Pa.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Consolidated Fruit Jar Co., New Brunswick, N. J.
Double Duty Products, Inc., Cleveland, O.
Glass Industries, Inc., New York, N. Y.
Grigoleit Co., The, Decatur, Ill.
Gutmann, Ferdinand & Co., Bklyn, N. Y.
Kimble Glass Co., Vineland, N. J.
Mundet Cork Corp., Closure Div., Bklyn, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Schnier, I. F., Co., San Francisco, Calif.
Super-Seal Container Corp., Washington, D. C.
Terkelsen Machine Co., Boston, Mass.
Victor Metal Products Corp., Bklyn, N. Y.
Wheeling Stamping Co., Wheeling, W. Va.
Wirz, A. H., Inc., Chester, Pa.

CLOSURES, ATOMIZER & SPRAY

Double Duty Products, Inc., Cleveland, O.
Glass Industries, Inc., New York, N. Y.
Federal Tool Co., Chicago, Ill.
Wilco Co., Los Angeles, Calif.
Windman Bros., Los Angeles, Calif.

CLOSURES, BAG

(Thermoplastic)

Betner, Benj. C., Co., Devon, Pa.
Dobeckmun Co., The, Cleveland, Ohio
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Interstate Folding Box Co., Middletown, Ohio
Mehl Mfg. Co., Cincinnati, Ohio
Milprint, Inc., Milwaukee, Wis.
Paramount Paper Products Co., Phila., Pa.
Royal, Thomas M., & Co., Phila., Pa.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Union Paste Co., Hyde Park, Mass.

CLOSURES, CERAMIC

General Felt Products, Inc., Bklyn, N. Y.
Vanderlaan Tile Co., New York, N. Y.

CLOSURES, CROWN

Armstrong Cork Co., Lancaster, Pa.
Bernardin Bottle Cap Co., Inc., Evansville, Ind.
Bond Crown & Cork Co., Div. of Continental Can Co., Inc., Wilmington, Del.
Continental Can Co., Inc., New York, N. Y.
Crown Cork & Seal Co., Baltimore, Md.
Gutmann, Ferdinand & Co., Bklyn, N. Y.
Mundet Cork Corp., Closure Div., Bklyn, N. Y.

CLOSURES, METAL

Acme Steel Co., Chicago, Ill.
Advanced Closures Corp., Bklyn, N. Y.
Ajax Bottle Cap Corp., Bklyn, N. Y.
Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Container Corp., Fulton, N. Y.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Aluminum Seal Co., New Kensington, Pa.
American Star Cork Co., Inc., Bklyn, N. Y.
Anchor Hocking Glass Corp., Lancaster, Ohio
Aridor Company, The, Chicago, Ill.
Armstrong Cork Co., Lancaster, Pa.
Art Tube Co., Inc., Irvington, N. J.
Ball Brothers Co., Muncie, Ind.
Bernardin Bottle Cap Co., Inc., Evansville, Ind.
Bond Crown & Cork Co., Div. of Continental Can Co., Inc., Wilmington, Del.
Brass Goods Mfg. Corp., Bklyn, N. Y.
Braun, W., Co., Chicago, Ill.
Bridgeport Metal Goods Mfg. Co., Bridgeport, Conn.
Cans, Inc., Chicago, Ill.
Carvin Bottle Cap Corp., Bklyn, N. Y.
Clark, J. L., Mfg. Co., Rockford, Ill.
Columbia Specialty Co., Inc., Baltimore, Md.
Crown Cork & Seal Co., Baltimore, Md.
Eastern Cap & Closure Corp., Baltimore, Md.
Ellis, George D., & Sons, Inc., Phila., Pa.
Empire Metal Cap Co., Inc., Bklyn, N. Y.
Fabart Instrument Co., Chicago, Ill.
Federal Tool Corp., Chicago, Ill.
General Can Co., Chicago, Ill.
Guardian Safety Seal Co., Chicago, Ill.
Gutmann, Ferdinand, & Co., Bklyn, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Henlopen Mfg. Co., Lewes, Del.
Keystone Cap Co., Columbia, Pa.
Mundet Cork Corp., Closure Div., Bklyn, N. Y.
National Can Corp., New York, N. Y.
National Seal Corp., Bklyn, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Prods., Pittsburgh, Pa.
Phoenix Metal Cap Co., Chicago, Ill.
Prescott, J. L., Co., Passaic, N. J.
Sager Bros., New York, N. Y.
Schnier, I. F., Co., San Francisco, Calif.
Scovill Mfg. Co., Waterbury, Conn.
Seal-Spout Corp., Newark, N. J.
Sterling Seal Co., Erie, Pa.
Swan Metal Cap Co., Inc., Chicago, Ill.
Trio Metal Cap Co., Chicago, Ill.
Upressit Products Corp., New York, N. Y.
Western Stopper Co., Inc., San Francisco, Calif.
West Penn Mfg. & Supply Corp., Brackenridge, Pa.
White Cap Co., Chicago, Ill.
Williams Sealing Corp., Decatur, Ill.
Wirz, A. H., Inc., Chester, Pa.

CLOSURES, METAL

(Tamperproof)

Acme Steel Co., Chicago, Ill.
Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Seal Co., New Kensington, Pa.
Anchor Hocking Glass Corp., Lancaster, Ohio
Art Tube Co., Inc., Irvington, N. J.
Crown Can Co., Phila., Pa.
Guardian Safety Seal Co., Chicago, Ill.
Gutmann, Ferdinand, & Co., Bklyn, N. Y.
Na-Mac Products Corp., Hollywood, Calif.
National Seal Corp., Bklyn, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Williams Sealing Corp., Decatur, Ill.

CLOSURES, MOLDED PLASTIC

American Molding Co., San Francisco, Calif.
Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Auburn Button Works, Inc., Auburn, N. Y.
Boonton Molding Co., Boonton, N. J.
Braun, W., Co., Chicago, Ill.
Bridgeport Moulded Prods., Inc., Bridgeport, Conn.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbus Plastic Products, Inc., Columbus, Ohio
Davies, Harry, Molding Co., Chicago, Ill.
Dodge Cork Co., Lancaster, Pa.
Drell Novelty Mfg. Co., The, New York, N. Y.
Eclipse Moulded Products Co., Milwaukee, Wis.
Federal Tool Corp., Chicago, Ill.
Fontaine Products Co., New York, N. Y.
Gemloid Corp., Elmhurst, Long Island N. Y.
General Electric Co., Plastics Div., Pittsfield, Mass.
Great American Plastics Co., Leominster, Mass.
Grigoleit Co., The, Decatur, Ill.
Kurz-Kasch, Inc., Dayton, Ohio
Mack Molding Co., Wayne, N. J.
Michigan Molded Plastics, Inc., Dexter, Mich.
Molded Insulation Co., Phila., Pa.
Mundet Cork Corp., Closure Div., Bklyn, N. Y.
Northern Industrial Chem. Co., S. Boston, Mass.
Nosco Plastics, Div. Natl. Organ Supply Co., Erie, Pa.
Owens-Illinois Glass Co., Toledo, Ohio
Owens-Illinois Pacific Coast Co., San Francisco, Calif.
Paragon Plastics, Inc., Seattle, Wash.
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Phoenix Metal Cap Co., Chicago, Ill.
Pittsburgh Plastics Co., New Kensington, Pa.
Plastic & Die Cast Prod. Corp., Los Angeles, Calif.
Plastic Engineering, Inc., Cleveland, Ohio
Plastics, Inc., Bradley Beach, N. J.
Precision Plastics Co., Phila., Pa.
Rathbun Molding Corp., Salamanca, N. Y.
Sager Bros., New York, N. Y.
Schnier, I. F., Co., San Francisco, Calif.
Sillcocks-Miller Co., The, S. Orange, N. J.
Standard Molding Co., Baltimore, Md.
Sterling Injection Molding, Inc., Buffalo, N. Y.
Sterling Plastics Co., Union, N. J.
Tech-Art Plastics Co., Long Island City, N. Y.
Terkelsen Machine Co., Boston, Mass.
Victor Metal Products Corp., Bklyn, N. Y.
Warren Plastics Corp., Warren, Pa.
Waterbury Companies, Inc., Waterbury, Conn.
Watertown Mfg. Co., Watertown, Conn.
Wheeling Stamping Co., Wheeling, W. Va.
Williams Sealing Corp., Decatur, Ill.
Windman Bros., Los Angeles, Calif.
Wirz, A. H., Inc., Chester, Pa.
Worcester Moulded Plastics Co., Worcester, Mass.

CLOSURES, PAPER

American Paper Goods Co., The, Kensington, Conn.
American Seal-Kap Co., Long Island City, N. Y.
Burt, F. N., Co., Inc., Buffalo, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
Cross Paper Products Corp., New York, N. Y.
Disbrow Mfg. Co., Newark, N. J.
Gates Paper Co., Ltd., Los Angeles, Calif.
General Felt Products, Inc., Bklyn, N. Y.
Guardian Safety Seal Co., Chicago, Ill.
Heminway Corp., Waterbury, Conn.
Kimble Glass Co., Vineland, N. J.
Mehl Mfg. Co., Cincinnati, Ohio
National Seal Corp., Bklyn, N. Y.
Niemand Bros., Inc., Long Island City, N. Y.
Ohio Boxboard Co., The, Rittman, Ohio
Owens-Illinois Glass Co., Toledo, Ohio
Paterson Parchment Paper Co., Bristol, Pa.
Randolph Paper Box Co., The, Richmond, Va.
Sealright Co., Inc., The, Fulton, N. Y.
Tompkins' Label Service, Phila., Pa.
Warner Bros. Co., The, Bridgeport, Conn.
Wheeler-Van Label Co., Grand Rapids, Mich.

CLOSURES, POURING SPOUT TYPE

Aridor Co., The, Chicago, Ill.
Guardian Safety Seal Co., Chicago, Ill.
National Seal Corp., Bklyn, N. Y.
Ohio Boxboard Co., The, Rittman, Ohio
Precision Plastics Co., Phila., Pa.
Seal-Spout Corp., Newark, N. J.
Warner Bros. Co., The, Bridgeport, Conn.
Wheeler-Van Label Co., Grand Rapids, Mich.

CLOSURES, SECONDARY CAPS & BANDS

(Cellulosic)

Armstrong Cork Co., Lancaster, Pa.
Celon Co., The, Madison, Wis.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Gutmann, Ferdinand, & Co., Bklyn, N. Y.
Schnier, I. F., Co., San Francisco, Calif.
Sylvania Industrial Corp., New York, N. Y.

CAPS & BANDS

(Foil)

Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Seal Co., New Kensington, Pa.
Armstrong Cork Co., Lancaster, Pa.
Art Tube Co., Inc., Irvington, N. J.
Gutmann, Ferdinand, & Co., Bklyn, N. Y.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.
Schnier, I. F., Co., San Francisco, Calif.

CLOSURES, SUPPLEMENTARY

(Bottle Applied)

Aluminum Seal Co., New Kensington, Pa.
Gutmann, Ferdinand, & Co., Bklyn, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Sealright Co., Inc., The, Fulton, N. Y.

CLOSURES, FOR VACUUM SEALING

Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Seal Co., New Kensington, Pa.
Anchor Hocking Glass Corp., Lancaster, Ohio
Aridor Co., The, Chicago, Ill.
Bernardin Bottle Cap Co., Inc., Evansville, Ind.
Crown Cork & Seal Co., Baltimore, Md.
Dewey & Almy Chemical Co., Cambridge, Mass.
Guardian Safety Seal Co., Chicago, Ill.
Gutmann, Ferdinand, & Co., Bklyn, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
National Seal Corp., Bklyn, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Phoenix Metal Cap Co., Chicago, Ill.
Super-Seal Container Corp., Washington, D. C.
White Cap Co., Chicago, Ill.
Williams Sealing Corp., Decatur, Ill.

Addresses of companies listed appear on pages 945–955

CLOSURES, WOOD

American Star Cork Co., Inc., Bklyn, N. Y.
Amdeco, New York, N. Y.
Gibson Jones Co., New York, N. Y.
Mundet Cork Corp., Closure Div., Bklyn, N. Y.
Paragon Wood Turning Co., Inc., New York, N. Y.
Schutze Bros., New York, N. Y.

COATINGS, PROTECTIVE, PERMANENT

(Bonding)

American Printing Ink Co., Div. General Printing Ink Corp., Chicago, Ill.
American Products Mfg. Co., New Orleans, La.
American Resinous Chemicals Corp., Peabody, Mass.
Atlas Powder Co., Zapon Div., Stamford, Conn., and N. Chicago, Ill.
Ault & Wiborg Corp., Div. Interchemical Corp., Cincinnati, Ohio
Bakelite Corp., New York, N. Y.
Ben Mont Papers, Inc., Bennington, Vt.
California Ink Co., Inc., The, San Francisco, Calif.
Carbide & Carbon Chemical Corp., Plastics Div., New York, N. Y.
Catalin Corp., New York, N. Y.
Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Clover Leaf Paint & Varnish Corp., Long Island City, N. Y.
Corn Products Refining Co., New York, N. Y.
Crescent Ink & Color Co. of Penna., Phila., Pa.
Davison Chemical Corp., The, Baltimore, Md.
Dewey & Almy Chemical Co., Cambridge, Mass.
Dow Chemical Co., The, Midland, Mich.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Durez Plastics & Chemicals, Inc., N. Tonawanda, N. Y.
Eagle Printing Ink Co., Div. General Printing Ink Corp., New York, N. Y.
Egyptian Lacquer Mfg. Co., The, New York, N. Y.
Fales Chemical Co., Inc., The, Cornwall Landing, N. Y.
Flint, Howard, Ink Co., Detroit, Mich.
Flood & Conklin Mfg. Co., Newark, N. J.
Floquil Products, Inc., New York, N. Y.
Fuchs & Lang Mfg. Co., The, Div. General Printing Ink Corp., New York, N. Y.
General Industrial Finishes, Div. General Printing Ink Corp., New York, N. Y.
General Printing Ink Corp., New York, N. Y.
George, P. D., Co., The, St. Louis, Mo.
Goodrich, B. F., Co., The, Akron, Ohio
Goodyear Tire & Rubber Co., The, Akron, Ohio
Gordon-Lacey Chemical Products Co., Maspeth, L. I., N. Y.
Heresite & Chemical Co., Manitowoc, Wis.
Huber, J. M., Inc., New York, N. Y.
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Keller-Dorian Corp., New York, N. Y.
Lauxite Corp., Lockport, N. Y.
Levey, Fred'k H., Co., Inc., New York, N. Y.
Maas & Waldstein Co., Newark, N. J.
Makalot Corp., Boston, Mass.
Marathon Corp., Menasha, Wis.
McCoy Paper Converters, Phila., Pa.
Milprint, Inc., Milwaukee, Wis.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Morrill, Geo. H., Co., Div. General Printing Ink Corp., New York, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Adhesives, New York, N. Y.
National Oil Products Co., Harrison, N. J.
National Waterproofing Co., Camden, N. J.
Naugatuck Chemical, Div. of U. S. Rubber Co., New York, N. Y.
Paisley Products, Inc., Chicago, Ill.
Paragon Plastics, Inc., Seattle, Wash.
Philadelphia Quartz Co., Phila., Pa.
Plastic Coating Corp., Holyoke, Mass.
Plastics Finishing Corp., Bklyn, N. Y.
Pope & Gray, Inc., New York, N. Y.
Powers Products, Inc., Chicago, Ill.
Presstite Engineering Co., St. Louis, Mo.
Protective Coatings, Inc., Detroit, Mich.
Pyrotex Leather Co., Leominster, Mass.
Pyroxylin Products, Inc., Chicago, Ill.
Reilly Tar & Chemical Corp., Indianapolis, Ind.
Roberts, Lewis, Inc., Newark, N. J.
Roosen, H. D., Co., Bklyn, N. Y.
Seal, Inc., Shelton, Conn.
Sinclair & Valentine Co., New York, N. Y.
Ullman, Sigmund, Co., Div. General Printing Ink Corp., New York, N. Y.
Union Carbide & Carbon Corp., New York, N. Y.
United Mfg. Co., Springfield, Mass.
U. S. Finishing & Mfg. Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.
Watson-Standard Co., The, Pittsburgh, Pa.
Wills & Roberts Plastics Mfg. Corp., Pasadena, Calif.
Zophar Mills, Inc., Bklyn, N. Y.

COATINGS, PROTECTIVE, REMOVABLE

(Strip Type)

American Resinous Chemicals Corp., Peabody, Mass.
Ault & Wiborg Div., Interchemical Corp., Cincinnati, Ohio
Babbitt Chemical Specialties Co., New York, N. Y.
Bakelite Corp., New York, N. Y.
Bischoff, Ernst, Co., Inc., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
George, P. D., Co., The, St. Louis, Mo.
Glidden Co., Cleveland, Ohio
Gordon-Lacey Chemical Prods. Co., Maspeth, L. I., N. Y.
Hercules Powder Co., Inc., Wilmington, Del.
Houghton, E. F., Co., Philadelphia, Pa.
Irvington Varnish & Insulator Co., Irvington, N. J.
Jones Dabney Co., Louisville, Ky.
Nox-Rust Corp., Chicago, Ill.
Paisley Products, Inc., Chicago, Ill.
Pontiac Varnish Co., Pontiac, Mich.
Presstite Engineering Co., St. Louis, Mo.
Seibert Varnish Co., Detroit, Mich.
United States Rubber Co., New York, N. Y.
Wills & Roberts Plastics Mfg. Co., Pasadena, Calif.
Zophar Mills, Inc., Bklyn, N. Y.

CORD, CELLULOSE

Blake, Moffitt & Towne, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Fibre Cord Co., New York, N. Y.
Sylvania Industrial Corp., New York, N. Y.

CORK SHEETS

(Paper-Backed)

General Felt Products, Div. Standard Cap & Seal Corp., Bklyn, N. Y.
Mundet Cork Corp., Closure Div., Bklyn, N. Y.

CORKS

American Star Cork Co., Inc., Bklyn, N. Y.
Armstrong Cork Co., Lancaster, Pa.
Dodge Cork Co., Inc., Lancaster, Pa.
Mundet Cork Corp., Closure Div., Bklyn, N. Y.

CORKS, ALUMINUM TOP

Armstrong Cork Co., Lancaster, Pa.
Consolidated Fruit Jar Co., New Brunswick, N. J.
Dodge Cork Co., Inc., Lancaster, Pa.
Mundet Cork Corp., Closure Div., Bklyn, N. Y.

CORKS, MOLDED TOP

Armstrong Cork Co., Lancaster, Pa.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Compo-Site Plastics Div., E. S. Lowe Co., Inc., Paterson, N. J.
Dodge Cork Co., Inc., Lancaster, Pa.
Mack Molding Co., Wayne, N. J.
Michigan Molded Plastics, Inc., Dexter, Mich.
Molded Insulation Co., Phila., Pa.
Mundet Cork Corp., Closure Div., Bklyn, N. Y.

CORKS, WOOD TOP

American Star Cork Co., Inc., Bklyn, N. Y.
Armstrong Cork Co., Lancaster, Pa.
Dodge Cork Co., Inc., Lancaster, Pa.
Mundet Cork Corp., Closure Div., Bklyn, N. Y.

DECALCOMANIA TRANSFERS

American Decalcomania Co., Chicago, Ill.
Bender, H. P., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Dobeckmun Co., The, Cleveland, Ohio
Foxon Co., The, Providence, R. I.
Howell, F. M., & Co., Elmira, N. Y.
Kaumagraph Co., Wilmington, Del.
McLaurin-Jones Co., Brookfield, Mass.
Meyercord Co., The, Chicago, Ill.
Palm Bros. Decalcomania Co., The, Cincinnati, Ohio
Palm, Fechteler & Co., New York, N. Y.
Process Displays, Inc., Milwaukee, Wis.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Talmadge Printing Co., New York, N. Y.
Universal Ceramics, New York, N. Y.

DESICCANTS, DEHYDRATING AGENTS

Davison Chemical Corp., The, Baltimore, Md.

DROPPERS, BOTTLE

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Brockway Glass Co., Inc., Brockway, Pa.
Glass Industries, Inc., New York, N. Y.
Kimble Glass Co., Vineland, N. J.
Mack Molding Co., Wayne, N. J.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.

EXCELSIOR, PAPER

(See also Paper, Excelsior and Shredded)

American Excelsior Corp., Chicago, Ill.
Ben Mont Papers, Inc., Bennington, Vt.
Criterion Paper & Twine Co., New York, N. Y.

Bold-face listings indicate advertisers in this issue

Crystal Tissue Co., Middletown, Ohio
Detroit Sulphite Pulp & Paper Co., Detroit, Mich.
Dunn Sulphite Paper Co., Port Huron, Mich.
Erving Paper Mills, Erving, Mass.
Excelsior Paper Specialties Co., New York, N. Y.
Inland Container Corp., Indianapolis, Ind.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Specialty Papers Co., Dayton, Ohio
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Sylvania Industrial Corp., New York, N. Y.
Traver Corp., Chicago, Ill.

FILTERS

Corning Glass Works, Corning, N. Y.
Kiefer, Karl, Machine Co., Cincinnati, Ohio
Scientific Filter Co., New York, N. Y.

FLOCK

Claremont Waste Mfg. Co., Claremont, N. H.
Rayon Processing Co. of R. I., Central Falls, R. I.

FOIL, COATED, LAMINATED, ETC.

Acme Backing Corp., Bklyn, N. Y.
Arvey Corp., Jersey City, N. J.
Bulkley, Dunton & Co., New York, N. Y.
Cleaveland Lab. & Mfg. Co., Inc., Peapack N. J.
Dobeckmun Co., The, Cleveland, Ohio
General Felt Products, Div. Standard Cap & Seal Corp., Brooklyn, N. Y.
Hazen Paper Co., Holyoke, Mass.
Holes, Floyd A., Co., The, Bedford, Ohio
Interstate Folding Box Co., Middletown, Ohio
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Keller-Dorian Corp., New York, N. Y.
Matthias Paper Corp., Philadelphia, Pa.
McLaurin-Jones Co., Brookfield, Mass.
Miller Paper Co., New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Shellmar Products Co., Mt. Vernon, O.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Waldorf Paper Products Co., St. Paul, Minn.

FOIL, METAL

(See also Paper Foil)

Aluminum Co. of America, Pittsburgh, Pa.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Keller-Dorian Corp., New York, N. Y.
Reynolds Metals Co., Inc., Richmond, Va.

GLASS, ROD & TUBING

Corning Glass Works, Corning, N. Y.
Glass Industries, Inc., New York, N. Y.
Kimble Glass Co., Vineland, N. J.
Pennsylvania Glass Products Co., Pittsburgh, Pa.

GLUES & PASTES

(See Adhesives)

INKS, MARKING & STENCIL

Bensing Bros. & Deeney, Phila., Pa.
Braden Sutphin Ink Co., The, Cleveland, Ohio
California Ink Co., Inc., The, San Francisco, Calif.
Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Flint, Howard, Ink Co., Detroit, Mich.
Floquil Products, Inc., New York, N. Y.
Force, Wm. A., & Co., Inc., Bklyn, N. Y.
Gottscho, Adolph, Inc., New York, N. Y.
Hill-Hentschel Co., St. Louis, Mo.
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Kaumagraph Co., Wilmington, Del.
Kelly, E. J., Co., Kalamazoo, Mich.
Markem Machine Co., Keene, N. H.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Melind, Louis, Chicago, Ill.
Noble & Westbrook Mfg. Co., The, E. Hartford, Conn.
Powers Products, Inc., Chicago, Ill.
Roosen, H. D., Co., Bklyn, N. Y.
Schwarm and Jacobus Co., The, Cincinnati, Ohio
Sinclair & Valentine Co., New York, N. Y.
Superior Type Co., The, Chicago, Ill.

INKS, PRINTING

(All Types)

Acme Printing Ink Co., Chicago, Ill.
American Printing Ink Co., Div. General Printing Ink Corp., Chicago, Ill.
Auld, Hampton, Inc., Newark, N. J.
Barta-Griffin Co., Worcester, Mass.
Bensing Bros. & Deeney, Phila., Pa.
Braden-Sutphin Ink Co., The, Cleveland, Ohio
California Ink Co., Inc., The, San Francisco, Calif.
Capitol Printing Ink Co., Inc., Washington, D. C.
Carlson, John P., Inc., Bklyn, N. Y.
Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Crescent Ink & Color Co. of Penn., Phila., Pa.
Driscoll, Martin & Co., Chicago, Ill.
Eagle Printing Ink Co., Div. General Printing Ink Corp., New York, N. Y.
Flint, Howard, Ink Co., Detroit, Mich.
Fuchs & Lang Mfg. Co., The, Div. General Printing Ink Corp., New York, N. Y.
Gaetjens, Berger & Wirth, Inc., Bklyn, N. Y.
General Printing Ink Corp., New York, N. Y.
Grady & Neary Co., Chicago, Ill.
Hellmuth, Charles, Printing Ink Corp., New York, N. Y.
Hill-Hentschel Co., St. Louis, Mo.
Hilton-Davis Co., Cincinnati, Ohio.
Huber, J. M., Inc., New York, N. Y.
International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Johnson, Chas. Eneu, & Co., Phila., Pa.
Kelly, E. J., Co., Kalamazoo, Mich.
Kohn & Madden Printing Ink Co., Chicago, Ill.
Levey, Fred'k H., Co., New York, N. Y.
Manufacturers Printing Ink Corp., Bklyn, N. Y.
Morrill, Geo. H., Co., Div. General Printing Ink Corp., New York, N. Y.
Pacific Printing Ink Co., San Francisco, Calif.
Pope & Gray, Inc., New York, N. Y.
Roberts, Lewis, Inc., Newark, N. J.
Roosen, H. D., Co., Bklyn, N. Y.
Schwarm & Jacobus Co., Cincinnati, Ohio
Siebold, J. H. & G. B., Inc., New York, N. Y.
Sinclair & Carroll Co., New York, N. Y.
Sinclair & Valentine Co., New York, N. Y.
Sleight Metallic Ink Co., Phila., Pa.
Superior Printing Ink Co., Inc., New York, N. Y.
Triangle Ink & Color Co., Inc., Bklyn, N. Y.
Ullman, Sigmund, Co., Div. General Printing Ink Corp., New York, N. Y.
Wilson, W. D., Printing Ink Co., Long Island City, N. Y.

LABELS, FOIL

American Colortype Co., Chicago, Ill.
Andersen, A. J., Chicago, Ill.
Attleboro Printing & Embossing Co., Attleboro, Mass.
Avery Adhesives, Los Angeles, Calif.
Bartlett Label Co., Kalamazoo, Mich.
Cameo Die & Label Co., New York, N. Y.
Craftsman Label Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Ever Ready Label Corp., New York, N. Y.
Fleming-Potter Co., Peoria, Ill.
Foxon Co., The, Providence, R. I.
French-Bray Printing Co., The, Baltimore, Md.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Grand Rapids Label Co., Grand Rapids, Mich.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kaumagraph Co., Wilmington, Del.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Krause, Richard M., Inc., New York, N. Y.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Milprint, Inc., Milwaukee, Wis.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Nalco, Inc., New York, N. Y.
Nevins-Church Press, The, New York, N. Y.
Pacific Label Co., Los Angeles, Calif.
Pollock Paper & Box Co., Dallas, Texas
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Reynolds Metals Co., Richmond, Va.
Robinson Tag & Label Co., New York, N. Y.
St. Louis Sticker Co., St. Louis, Mo.
Schmidt, Henry & Bro., Inc., Phila., Pa.
Shellmar Products Co., Mt. Vernon, O.
Shuman, Frank G., Co., The, Chicago, Ill.
Tablet & Ticket Co., The, Chicago, Ill.
Talmadge Printing Co., New York, N. Y.
Tompkins' Label Service, Phila., Pa.
Traver Corp., Chicago, Ill.
Unique Printed Products Co., Inc., Terre Haute, Ind.
Warner Brothers Co., The, Bridgeport, Conn.
Wheeler-Van Label Co., Grand Rapids, Mich.
Wynekoop, Walker, Co., Chicago, Ill.

LABELS, HEAT SEAL

Attleboro Printing & Embossing Co., Inc., Attleboro, Mass.
Crocker-Union, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Ever Ready Label Corp., New York, N. Y.
Foxon Co., The, Providence, R. I.
Grand Rapids Label Co., Grand Rapids, Mich.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Marathon Corp., Menasha, Wis.
Miller & Miller, Atlanta, Ga.
Milprint, Inc., Milwaukee, Wis.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Oliver Machinery Co., Pkg. Div., Grand Rapids, Mich.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Robinson Tag and Label Co., New York, N. Y.

St. Louis Sticker Co., St. Louis, Mo.
Shellmar Products Co., Mt. Vernon, O.
Shuman, Frank G., Co., The, Chicago, Ill.
Tompkins' Label Service, Phila., Pa.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.

LABELS, ROLL TYPE

(For Shipping, Marking, Etc.)

Attleboro Printing & Embossing Co., Inc., Attleboro, Mass.
Avery Adhesives, Los Angeles, Calif.
Bartlett Label Co., Kalamazoo, Mich.
Crocker-Union, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Economy Novelty & Printing Co., New York, N. Y.
Ever Ready Label Corp., New York, N. Y.
Foxon Co., The, Providence, R. I.
Grand Rapids Label Co., Grand Rapids, Mich.
Gummed Tape & Devices Co., Bklyn, N. Y.
Ketcham, Howard, Inc., New York, N. Y.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Krause, Richard M., Inc., New York, N. Y.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Miller & Miller, Atlanta, Ga.
Nalco, Inc., New York, N. Y.
Nashua Package Sealing Co., Nashua, N. H.
Oliver Machinery Co., Pkg. Div., Grand Rapids, Mich.
Pollock Paper & Box Co., Dallas, Texas
Rexford Paper Co., Milwaukee, Wis.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Robinson Tag & Label Co., New York, N. Y.
Royal, Thomas M., & Co., Phila., Pa.
Shuman, Frank G., Co., The, Chicago, Ill.
Talmadge Printing Co., New York, N. Y.
Tompkins' Label Service, Phila., Pa.
Unique Printed Products Co., Inc., Terre Haute, Ind.

LABELS, ROLL TYPE

(Heat Sealing)

Dennison Mfg. Co., Framingham, Mass.
Ever Ready Label Corp., New York, N. Y.
Foxon Co., The, Providence, R. I.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Marathon Corp., Menasha, Wis.
Milprint, Inc., Milwaukee, Wis.
Oliver Machinery Co., Grand Rapids, Mich.
Shellmar Products Co., Mt. Vernon, O.
Shuman, Frank G., Co., Chicago, Ill.
Tompkins' Label Service, Phila. Pa.

LABELS, SHIPPING

Avery Adhesives, Los Angeles, Calif.
Bartlett Label Co., Kalamazoo, Mich.
Dennison Mfg. Co., Framingham, Mass.
Economy Novelty & Printing Co., New York, N. Y.
Eureka Specialty Printing Co., Scranton, Pa.
Ever Ready Label Corp., New York, N. Y.
Fenton Label Co., Phila., Pa.
Fleming-Potter Co., Inc., Peoria, Ill.
Foxon Co., The, Providence, R. I.
Glue Fast Equipment Co., Inc., New York, N. Y.
Grand Rapids Label Co., Grand Rapids, Mich.
Gummed Tape & Devices Co., Bklyn, N. Y.
Howell, F. M. & Co., Elmira, N. Y.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Lehmann Printing & Litho. Co., San Francisco, Calif.
Magill-Weinsheimer Co., Chicago, Ill.
Market Printing Co., Chicago, Ill.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Miller & Miller, Atlanta, Ga.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Nashua Package Sealing Co., Nashua, N. H.
Pictorial Paper Package Corp., Aurora, Ill.
Rexford Paper Co., Milwaukee, Wis.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Robinson Tag & Label Co., New York, N. Y.
Sears, Merle, Paper Box Co., Danville, Ill.
St. Louis Lithographing Co., St. Louis, Mo.
St. Louis Sticker Co., St. Louis, Mo.
Shuman, Frank G., Co., The, Chicago, Ill.
Sterling Offset Co., New York, N. Y.
Tablet & Ticket Co., The, Chicago, Ill.
Talmadge Printing Co., New York, N. Y.
Tompkins' Label Service, Phila., Pa.
Unique Printed Products Co., Inc., Terre Haute, Ind.
Wheeler-Van Label Co., Grand Rapids, Mich.

LABELS, STOCK

Bartlett Label Co., Kalamazoo, Mich.
Consolidated Litho. Corp., Bklyn, N. Y.
Crocker-Union, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Empire Lithographing Co., Inc., New York, N. Y.
Eureka Specialty Printing Co., Scranton, Pa.
Ever Ready Label Corp., New York, N. Y.
Fenton Label Co., Phila., Pa.
Gamse Lithographing Co., Inc., Baltimore, Md.
Kaumagraph Co., Wilmington, Del.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Lehmann Printing & Litho. Co., San Francisco, Calif.
Market Printing Co., Chicago, Ill.
Michigan Lithographing Co., Grand Rapids, Mich.
Miller & Miller, Atlanta, Ga.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Muirson Label Co., Inc., Bklyn, N. Y.
Nalco, Inc., New York, N. Y.
National Color Printing Co., Inc., Baltimore, Md.
Reyburn Mfg. Co., Inc., Phila., Pa.
Roesch, Louis, Co., San Francisco, Calif.
Roman, Martin L., Co., The, New York, N. Y.
Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Schmidt Lithograph Co., San Francisco, Calif.
Sears, Merle, Paper Box Co., Danville, Ill.
Shuman, Frank G., Co., The, Chicago, Ill.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sterling Offset Co., New York, N. Y.
Strobridge Lithographing Co., The, Cincinnati, Ohio
Talmadge Printing Co., New York, N. Y.
Tompkins' Label Service, Phila., Pa.
Trautmann, Bailey & Blampey, New York, N. Y.
Unique Printed Products Co., Inc., Terre Haute, Ind.
United Mfg. Co., Springfield, Mass.
U. S. Printing & Lithograph Co., The, Norwood, Cincinnati, Ohio
Waddill Printing & Lithographing Co., Danville, Va.
Wheeler-Van Label Co., Grand Rapids, Mich.
Williams, Chas. W., & Co., Inc., New York, N. Y.

LABELS, TRANSPARENT

Avery Adhesives, Los Angeles, Calif.
Bender, H. P., New York, N. Y.
Cellulose Packaging Corp., New York, N. Y.
Crystal Transparent Mfg. Co., Inc., New York, N. Y.
Crystal Tube Corp., Chicago, Ill.
Dennison Mfg. Co., Framingham, Mass.
Dobeckmun Co., The, Cleveland, Ohio
Ever Ready Label Corp., New York, N. Y.
Foxon Co., The, Providence, R. I.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Milprint, Inc., Milwaukee, Wis.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Neostyle, Inc., Chicago, Ill.
Pacific Label Co., Los Angeles, Calif.
Palm Bros. Decalcomania Co., The, Cincinnati, Ohio
Palm, Fechteler & Co., New York, N. Y.
Paramount Paper Prods. Co., Inc., Phila., Pa.
Price, M. B., Associates, New York, N. Y.
Robinson Tag & Label Co., New York, N. Y.
Royal, Thomas M., & Co., Phila., Pa.
St. Louis Sticker Co., St. Louis, Mo.
Shellmar Products Co., Mt. Vernon, Ohio
Tablet & Ticket Co., The, Chicago, Ill.
Tompkins' Label Service, Phila., Pa.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Unique Printed Products Co., Inc., Terre Haute, Ind.
Wheeler-Van Label Co., Grand Rapids, Mich.

LABELS, WATER-RESISTANT

Avery Adhesives, Los Angeles, Calif.
Crocker-Union, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kaumagraph Co., Wilmington, Del.
Kelly, E. J., Co., Kalamazoo, Mich.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Milprint, Inc., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.
Robinson Tag & Label Co., New York, N. Y.
Shuman, Frank G., Co., The, Chicago, Ill.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Talmadge Printing Co., New York, N. Y.
Tompkins' Label Service, Phila., Pa.
Traver Corp., Chicago, Ill.
United States Rubber Co., New York, N. Y.
Wheeler-Van Label Co., Grand Rapids, Mich.

LABELS & WRAPPERS, PRINTED, LITHOGRAPHED & EMBOSSED

Addison Lithographing Co., Rochester, N.Y.
American Colortype Co., Chicago, Ill.
Andersen, A. J., Chicago, Ill.
Anderson, Geo. W., Inc., Long Island City, N. Y.
Attleboro Printing & Embossing Co., Attleboro, Mass.
Bartlett Label Co., Kalamazoo, Mich.
Brandau-Craig-Dickerson Co., Nashville, Tenn.
Brooks & Porter, Inc., New York, N. Y.
Brooks Bank Note Co., Springfield, Mass.
Burnet Co., R. L., San Antonio, Texas
Burt, F. N., Co., Inc., Buffalo, N. Y.
Calvert Lithographing Co., Detroit, Mich.

Cambridge Paper Box Co., Cambridge, Mass.
Cameo Die & Label Co., New York, N. Y.
Central Lithograph Co., The, Cleveland, Ohio
Chaspec Mfg. Co., New York, N. Y.
Consolidated Lithographing Corp., Bklyn, N. Y.
Courier Journal Job Printing Co., Louisville, Ky.
Craftsman Label Co., New York, N. Y.
Creative Printmakers Group, New York, N. Y.
Crocker-Union, San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Economy Novelty & Printing Co., New York, N. Y.
Edwards & Deutsch Lithographing Co., Chicago, Ill.
Empire Lithographing Co., Inc., New York, N. Y.
Eureka Specialty Printing Co., Scranton, Pa.
Ever Ready Label Corp., New York, N. Y.
Fairchild, E. E., Corp., Rochester, N. Y.
Fenton Label Co., Phila., Pa.
Fibreboard Products, San Francisco, Calif.
Fitzhugh, Wm. W., Inc., New York, N. Y.
Fleming-Potter Co., Peoria, Ill.
Forbes Lithograph Mfg. Co., The, Boston, Mass.
Foxon Co., The, Providence, R. I.
Gamse Lithographing Co., Inc., Baltimore, Md.
Globe Paper Box Co., Chicago, Ill.
Grace, Tom W., Co., Dallas, Texas
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Grand Rapids Label Co., Grand Rapids, Mich.
Howell, F. M., & Co., Elmira, N. Y.
Inland Lithograph Co., Chicago, Ill.
Kaumagraph Co., Wilmington, Del.
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Krause, Richard M., Inc., New York, N. Y.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Lehman Printing and Litho. Co., San Francisco, Calif.
Lord Baltimore Press, New York, N. Y.
Magill-Weinsheimer Co., Chicago, Ill.
Market Printing Co., Chicago, Ill.
Michigan Lithographing Co., The, Grand Rapids, Mich.
Miller & Miller, Atlanta, Ga.
Milprint, Inc., Milwaukee, Wis.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Muirson Label Co., Inc., Bklyn, N. Y.
Nalco, Inc., New York, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Nashua Package Sealing Co., Inc., Nashua, N. H.
National Color Printing Co., Inc., The, Baltimore, Md.
National Process Co., New York, N. Y.
Nevins-Church Press, New York, N. Y.
Oberly & Newell Lithograph Corp., New York, N. Y.
Old Dominion Box Co., Lynchburg, Va.
Pacific Label Co., Los Angeles, Calif.
Philipp Lithographing Co., Milwaukee, Wis.
Pictorial Paper Package Corp., Aurora, Ill.
Plastic Coating Corp., The, Holyoke, Mass.
Pollock Paper & Box Co., Dallas, Texas
Progress Lithographing Co., The, Reading, Ohio
Rainbow Lithographing Co., The, Cincinnati, Ohio
Reed Tissues Corp., Little Falls, N. Y.
Rexford Paper Co., Milwaukee, Wis.
Reyburn Mfg. Co., Inc., Phila., Pa.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Robinson Tag & Label Co., New York, N. Y.
Rode & Brand, New York, N. Y.
Roesch, Louis, Co., San Francisco, Calif.
Roman, Martin L., Co., The, New York, N. Y.
Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Rowell, E. N., Batavia, N. Y.
Royal, Thomas M., & Co., Phila., Pa.
St. Louis Lithographing Co., St. Louis, Mo.
St. Louis Sticker Co., St. Louis, Mo.
Schmidt, Henry & Bro., Inc., Phila., Pa.
Schmidt Lithograph Co., San Francisco, Calif.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Shuman, Frank G., Co., The, Chicago, Ill.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sterling Offset Co., New York, N. Y.
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Tablet & Ticket Co., The, Chicago, Ill.
Talmadge Printing Co., New York, N. Y.
Tompkins' Label Service, Phila., Pa.
Trade Lithograph & Printing Co., Inc., New York, N. Y.
Trautmann, Bailey & Blampey, New York, N. Y.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Unique Printed Products Co., Inc., Terre Haute, Ind.
United States Printing & Lithograph Co., The, Cincinnati, Ohio
Waddill Printing & Lithographing Co., Danville, Va.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Weber Addressing Machine Co., Chicago, Ill.
Wheeler-Van Label Co., Grand Rapids, Mich.
Wilkata Folding Box Co., Kearny, N. J.
Wilmanns Bros. Co., Milwaukee, Wis.

LACQUERS & VARNISHES

(See Coatings, Protective)

LEATHERETTE

(See also Paper, Imitation Leather)

Anderson, Geo. W., Inc., Long Island City, N. Y.
Atlas Powder Co., Zapon Div., Stamford, Conn., & N. Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Columbus Coated Fabrics Corp., Columbus, Ohio
Dejonge, Louis & Co., New York, N. Y.
Detroit Sulphite Pulp & Paper Co., Detroit, Mich.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Griffin, Campbell, Hayes, Walsh, Inc., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Holliston Mills, Inc., The, Norwood, Mass.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
National Metal Edge Box Co., Phila., Pa.
Pyrotex Leather Co., Leominster, Mass.
Riegel Paper Corp., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Springfield Coated Paper Corp., Camden, N. J.
Tamm & Co., New York, N. Y.
Textileather Corp., Toledo, Ohio
United Mfg. Co., Springfield, Mass.
Wyomissing Glazed Paper Co., Reading, Pa.

LINERS, BAG, BARREL, BOX & CASE

Andrews, O. B., Co., Chattanooga, Tenn.
Angier Corp., Framingham, Mass.
Arkell Safety Bag Co., New York, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C., Co., Devon, Pa.
Bradner, Smith & Co., Chicago, Ill.
Bulkley, Dunton & Co., New York, N. Y.
Central States Paper & Bag Co., St. Louis, Mo.
Central Waxed Paper Co., Chicago, Ill.
Chase Bag Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Criterion Paper & Twine Co., New York, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Dejonge, Louis, & Co., New York, N. Y.
Dobeckmun Co., The, Cleveland, Ohio
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Fitchburg Paper Co., Fitchburg, Mass.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Gardner-Richardson Co., The, Middletown, Ohio
Goodyear Tire & Rubber Co., Akron, Ohio
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hardin Bag & Burlap Co., Inc., The, New Orleans, La.
Hummel-Ross Fibre Corp., Hopewell, Va.
Inland Container Corp., Indianapolis, Ind.
Interstate Folding Box Co., Middletown, Ohio
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
LaBoiteaux Co., Inc., The, Cincinnati, Ohio
Marathon Corp., Menasha, Wis.
Mehl Mfg. Co., Cincinnati, Ohio
Matthias Paper Corp., Phila., Pa.
Milprint, Inc., Milwaukee, Wis.
Modern Containers, Inc., Los Angeles, Calif.
Moist-R-Proof Container Co., San Francisco, Calif.
Munson Bag Co., The, Cleveland, Ohio
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
Oxford Paper Co., New York, N. Y.
Paterson Parchment Paper Co., Bristol, Pa.
Pollock Paper & Box Co., Dallas, Texas
Ralston, W., & Co., Inc., Niagara Falls, N. Y.
Rinkle Krinkle Paper Co., Boston, Mass.
Rexford Paper Co., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
St. Regis Paper Co., New York, N. Y.
Schmidt Lithograph Co., San Francisco, Calif.
Shaw-Randall Co., Pawtucket, R. I.
Shellmar Products Co., Mt. Vernon, Ohio
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Specialty Papers Co., The, Dayton, Ohio
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Ullman Bag Co., Detroit, Mich.
Williams, Chas. W., & Co., Inc., New York, N. Y.

LINERS, CLOSURE

(See Closure Liners)

OPENING TAPE

(For Cellophane Packages)

Chicago Printed String Co., Chicago, Ill.
Dobeckmun Co., The, Cleveland, Ohio
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Fibre Cord Co., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Sylvania Industrial Corp., New York, N. Y.
Walser Mfg. Co., Inc., Clifton, N. J.

PADDING & WADDING

American Excelsior Corp., Chicago, Ill.
American Lace Paper Co., Milwaukee, Wis.
Cellulose Wadding Products, Inc., Garwood, N. J.
Cottonluxe Mfg., Co., New York, N. Y.
Criterion Paper & Twine Co., New York, N. Y.
Excelsior Paper Specialties Co., Inc., New York, N. Y.
Henle Wax Paper Mfg. Co., Inc., The, New York, N. Y.
Jiffy Mfg. Co., Hillside, N. J.
Kimberly-Clark Corp., Neenah, Wis.
Republic Paperboard Co., The, Cincinnati, Ohio
Rinkle Krinkle Paper Co., Boston, Mass.
Salwen, Joe, Paper Co., New York, N. Y.
Sherman Paper Prods. Corp., Newton Upper Falls, Mass.
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Union Wadding Co., Pawtucket, R. I.

PAPER, ALKALI-PROOF

Bradner Smith & Co., Chicago, Ill.
Bulkley, Dunton & Co., New York, N. Y.
Carbide & Carbon Chemicals Corp., New York, N. Y.
Champion Paper & Fibre Co., Hamilton, Mass.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Criterion Paper & Twine Co., New York, N. Y.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
Dunn Sulphite Paper Co., Port Huron, Mich.
Fitchburg Paper Co., Fitchburg, Mass.
General Felt Products, Div. Standard Cap & Seal Corp., Bklyn, N. Y.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Charles F., Co., New York, N. Y.
Hollingsworth & Whitney Co., Boston, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Matthias Paper Corp., Phila., Pa.
Milprint, Inc., Milwaukee, Wis.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oxford Paper Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Reigel Paper Corp., New York, N. Y.
Smith, H. P., Paper Co., Chicago, Ill.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Union Carbide & Carbon Corp., New York, N. Y.
United Mfg. Co., Springfield, Mass.
Warren, S. D., Co., Boston, Mass.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, ANTI-TARNISH

Angier Corp., Framingham, Mass.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Bulkley, Dunton & Co., New York, N. Y.
Chemical Paper Mfg. Co., Holyoke, Mass.
Criterion Paper & Twine Co., New York, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Crystal Tissue Co., Middletown, Ohio
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Fitchburg Paper Co., Fitchburg, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Charles F., Co., New York, N. Y.
Hollingsworth & Whitney Co., Boston, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Mosinee Paper Mills Co., Mosinee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Pejepscot Paper Co., Inc., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Riegel Paper Corp., New York, N. Y.
Rondout Paper Mills, Inc., Napanoch, N. Y.
Shawmut Waxed Paper Co., Holliston, Mass.
Smith, H. P., Paper Co., Chicago, Ill.
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
United Mfg. Co., Springfield, Mass.
Warren, S. D., Co., Boston, Mass.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, CAST COATED

Champion Paper & Fibre Co., The, Hamilton, Ohio
Heaphy, Charles F., Co., New York, N. Y.
Matthias Paper Corp., Phila., Pa.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.

PAPER, CLOTH LINED

Angier Corp., Framingham, Mass.
Atlantic Gummed Paper Corp., Bklyn, N. Y.
Chase Bag Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Holes, Floyd A., Co., The, Bedford, Ohio
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Middlesex Products Corp., Cambridge, Mass.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
Ralston, W., & Co., Inc., Niagara Falls, N. Y.
Rexford Paper Co., Milwaukee, Wis.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
United Mfg. Co., Springfield, Mass.
Williams, Chas., W., & Co., Inc., New York, N. Y.

PAPER, CORRUGATED

(Flexible, Wrapping & Packing)

Ajax Box Co., Chicago, Ill.
Andrews, O. B., Co., Chattanooga, Tenn.
Angier Corp., Framingham, Mass.
Ashtabula Corrugated Box Co., The, Ashtabula, Ohio
Birmingham Paper Co., Birmingham, Ala.
Blake, Moffitt & Towne, San Francisco, Calif.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Criterion Paper & Twine Co., New York, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Gair, Robert Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Grand-City Container Corp., New York, N. Y.
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Inland Container Corp., Indianapolis, Ind.
Kress, F. J., Box Co., Pittsburgh, Pa.
National Container Corp., Long Island City, N. Y.
Ottowa River Paper Co., The, Toledo, O.
Owens-Illinois Glass Co., Toledo, Ohio
Salwen, Joe, Paper Co., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Yorkville Paper Co., Inc., New York, N. Y.

PAPER, CORRUGATED

(For Window Trimming)

Ajax Box Co., Chicago, Ill.
Excelsior Paper Specialties Co., Inc., New York, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Gaylord Container Corp., St. Louis, Mo.
Hankins Container Co., Cleveland, Ohio
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Inland Container Corp., Indianapolis, Ind.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, Geo. H., Inc., Cambridge, Mass.

PAPER, CREPE

American Tissue Mills, Holyoke, Mass.
Angier Corp., Framingham, Mass.
Chase Bag Co., Chicago, Ill.
Cincinnati Industries Inc., Cincinnati (Lockland), Ohio
Dennison Mfg. Co., Framingham, Mass.
Dunn Sulphite Paper Co., Port Huron, Mich.
Erving Paper Mills, Erving, Mass.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Mosinee Paper Mills Co., Mosinee, Wis.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Ralston, W., & Co., Inc., Niagara Falls, N. Y.
Reed Tissues Corp., Little Falls, N. Y.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Thilmany Pulp & Paper Co., Kaukauna, Wis.

PAPER, EXCELSIOR & SHREDDED

American Excelsior Corp., Chicago, Ill.
Atlantic Excelsior Co., Inc., New York, N. Y.
Ben Mont Papers, Inc., Bennington, Vt.

Bold-face listings indicate advertisers in this issue

Criterion Paper & Twine Co., New York, N. Y.
Crystal Tissue Co., The, Middletown, Ohio
Daniels Mfg. Co., Rhinelander, Wis.
Dennison Mfg. Co., Framingham, Mass.
Detroit Sulphite Pulp & Paper Co., Detroit, Mich.
Dunn Sulphite Paper Co., Port Huron, Mich.
Erving Paper Mills, Erving, Mass.
Excelsior Paper Specialties Co., Inc., New York, N. Y.
Inland Container Corp., Indianapolis, Ind.
Jiffy Mfg. Co., Hillside, N. J.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Specialty Papers Co., Dayton, Ohio
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Traver Corp., Chicago, Ill.
Waxed Papers, Inc., Long Island City, N. Y.
Yorkville Paper Co., Inc., New York, N. Y.

PAPER, FANCY PRINTED OR EMBOSSED

Aldine Paper Co., New York, N. Y.
Anderson, George W., Inc., Long Island City, N. Y.
Ben Mont Papers, Inc., Bennington, Vt.
Bradner Smith & Co., Chicago, Ill.
Champion Paper & Fibre Co., The, Hamilton, Ohio
Chemical Paper Mfg. Co., Holyoke, Mass.
Chicago Paper Co., Chicago, Ill.
Chicago Printed String Co., Chicago, Ill.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Crown Zellerbach Corp., San Francisco, Calif.
Crystal Tissue Co., Middletown, Ohio
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis, & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Detroit Sulphite Pulp & Paper Co., Detroit, Mich.
District of Columbia Paper Mills, Inc., Washington, D. C.
Eureka Specialty Prtg. Co., Scranton, Pa.
Frann Paper Co., Bklyn, N. Y.
Gala Giftwraps & Specialties, Inc., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Charles F., Co., New York, N. Y.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Narragansett Coated Paper Corp., Pawtucket, R. I.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
New England Card & Paper Co., Inc., Springfield, Mass.
Paper Affiliates, Dept., Nalco, Inc., New York, N. Y.
Paper City Mfg. Co., Inc., Holyoke, Mass.
Pejepscot Paper Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Racquette River Paper Co., Potsdam, N. Y.
Reinhold-Gould, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Shellmar Products Co., Mount Vernon, Ohio
Simplex Textured Reproductions, Inc., New York, N. Y.
Springfield Coated Paper Corp., Camden, N. J.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Stevens, Nelson Paper Corp., New York, N. Y.
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Tamm & Co., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Trautmann, Bailey & Blampey, New York, N. Y.
Traver Corp., Chicago, Ill.
Twitchell, E. W. Inc., Pkg. Div., Phila., Pa.
United Mfg. Co., Springfield, Mass.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Whiting, C. R., Co., Inc., Hackensack, N. J.
Wyomissing Glazed Paper Co., Reading, Pa.
Yorkville Paper Co., Inc., New York, N. Y.

PAPER, FLINT GLAZED

Bradner Smith & Co., Chicago, Ill.
Chicago Paper Co., Chicago, Ill.
Dejonge, Louis, & Co., New York, N. Y.
Fitchburg Paper Co., Fitchburg, Mass.
Frann Paper Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Charles F., Co., New York, N. Y.
Hinkson Paper Co., Palmer, Mass.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Paper Affiliates Co., New York, N. Y.
Pejepscot Paper Co., Inc., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Twitchell, E. U., Inc., Packaging Div., Phila., Pa.
United Mfg. Co., Springfield, Mass.
Warren, S. D., Co., Boston, Mass.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, FOIL

Aluminum Co. of America, Pittsburgh, Pa.
Aldine Paper Co., New York, N. Y.
Blake, Moffit & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Crown Zellerbach Corp., San Francisco, Calif.
Dejonge, Louis, & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
District of Columbia Paper Mills, Inc., Washington, D. C.
Frann Paper Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Charles F., Co., New York, N. Y.
Hughes & Hoffman, New York, N. Y.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Middlesex Products Corp., Cambridge, Mass.
Miller Paper Co., New York, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Paper Affiliates Co., New York, N. Y.
Paper City Mfg. Co., Inc., Holyoke, Mass
Reynolds Metals Co., Richmond Va.
Royal Paper Corp., New York, N. Y.
Springfield Coated Paper Corp., Camden, N. J.
Stevens, Nelson Paper Corp., New York, N. Y.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, FRICTION GLAZED

Aldine Paper Co., New York, N. Y.
Ben Mont Papers, Inc., Bennington, Vt.
Bradner Smith & Co., Chicago, Ill.
Champion Paper & Fibre Co., The, Hamilton, Ohio
Chicago Paper Co., Chicago, Ill.
Crown Zellerbach Corp., San Francisco, Calif.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Fitchburg Paper Co., Fitchburg, Mass.
Frann Paper Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hinkson Paper Co., Palmer, Mass.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Narragansett Coated Paper Corp., Pawtucket, R. I.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Paper Affiliates Co., New York, N. Y.
Pejepscot Paper Co., Inc., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Springfield Coated Paper Corp., Camden, N. J.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
United Mfg. Co., Springfield, Mass.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, GLASSINE

(Plain & Embossed)

Daniels Mfg. Co., Rhinelander, Wis.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dennison Mfg. Co., Framingham, Mass.
Glassine Paper Co., Conshohocken, Pa.
Hamersley Mfg. Co., The, Garfield, N. J.
Hartford City Paper Co., New York, N. Y.
Henle Wax Paper Mfg. Co., Inc., The, New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Rhinelander Paper Co., Rhinelander, Wis.
Riegel Paper Corp., New York, N. Y.
Smith, H. P., Paper Co., Chicago, Ill.
Southern Waxed Paper Co., Atlanta, Ga.
Sweetnam, George H., Inc., Cambridge, Mass.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Westfield River Paper Co., Inc., Russell, Mass.

PAPER, GREASEPROOF

Angier Corp., Framingham, Mass.
Arvey Corp., Jersey City, N. J.
Blake, Moffitt & Towne, San Francisco, Calif.
Bulkley, Dunton & Co., New York, N. Y.

Addresses of companies listed appear on pages 945–955

Cellutin Corp , The, Holyoke, Mass.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Criterion Paper & Twine Co., New York, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dejonge, Louis, & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Hamersley Mfg. Co., The, Garfield, N. J.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Charles F., Co., New York, N. Y.
Henle Wax Paper Mfg. Co., Inc., The, New York, N. Y.
Holes, Floyd A., Co., The Bedford, Ohio
Hughes & Hoffman, New York, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Milprint, Inc., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Presstite Engineering Co., St. Louis, Mo.
Riegel Paper Corp., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, George H., Inc., Cambridge, Mass.
Sylvania Industrial Corp., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Warren S. D., Co., Boston, Mass.
Westfield River Paper Co., Inc., Russell, Mass.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PAPER, GUMMED

Angier Corp., Framingham, Mass.
Atlantic Gummed Paper Corp., Bklyn, N. Y.
Better Packages, Inc., Shelton, Conn.
Blake, Moffitt & Towne, San Francisco, Calif.
Brown-Bridge Mills, Inc., The, Troy, Ohio
Chicago Gum Tape Co., Chicago, Ill.
Criterion Paper & Twine Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Eureka Specialty Printing Co., Scranton, Pa.
Gummed Products Co., The, Troy, Ohio
Gummed Tape & Devices Co., Bklyn, N. Y.
Heaphy, Charles F., Co., New York, N. Y.
Knowlton, M. D., Co., Rochester, N. Y.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago, Ill.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Rexford Paper Co., Milwaukee, Wis.
Salwen, Joe, Paper Co., New York, N. Y.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PAPER, HEAT SEALING

Bradner Smith & Co., Chicago, Ill.
Bulkley, Dunton & Co., New York, N. Y.
Central Waxed Paper Co., Chicago, Ill.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Criterion Paper & Twine Co., New York, N. Y.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis, & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
General Felt Products, Div. Standard Cap & Seal Corp., Bklyn, N. Y.
Goodyear Tire & Rubber Co., Akron, Ohio
Hazen Paper Co., Holyoke, Mass.
Heaphy, Charles F., Co., New York, N. Y.
Henle Wax Paper Mfg. Co., Inc., The, New York, N. Y.
Holes, Floyd A., Co., The, Bedford, Ohio
Hubbs, Charles F. & Co., New York, N. Y.
Hughes & Hoffman, New York, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Marathon Corp., Menasha, Wis.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago, Ill.
Milprint, Inc., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oxford Paper Co., New York, N. Y.
Pyrotex Leather Co., Leominster, Mass.
Riegel Paper Corp., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Specialty Papers Co., The, Dayton, Ohio
Sylvania Industrial Corp., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Packaging Div. Phila., Pa.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Waxed Papers, Inc., Long Island City, N. Y.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PAPER, IMITATION FOIL

Aldine Paper Co., New York, N. Y.
Anderson, Geo. W., Inc., Long Island City, N. Y.
Bradner Smith & Co., Chicago, Ill.
Chicago Paper Co., Chicago, Ill.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Coughlin Mfg. Co., New York, N. Y.
Dejonge, Louis, & Co., New York, N. Y.
Frann Paper Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Charles F., Co., New York, N. Y.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Co., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Miller Paper Co., New York, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Oxford Paper Co., New York, N. Y.
Paper Affiliates Co., New York, N. Y.
Reinhold-Gould, Inc., New York, N. Y.
Riegel Paper Corp., New York, N. Y.
Springfield Coated Paper Corp., Camden, N. J.
Tamm & Co., New York, N. Y.
Warren, S. D., Co., Boston, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading Pa.
Yorkville Paper Co., Inc., New York, N. Y.

PAPER, IMITATION LEATHER

Aldine Paper Co., New York, N. Y.
Anderson, George W., Inc., Long Island City, N. Y.
Atlas Powder Co., Zapon Div., Stamford, Conn., & N. Chicago, Ill.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Chicago Paper Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Columbus Coated Fabrics Corp., Columbus, Ohio
Dejonge, Louis, & Co., New York, N. Y.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Frann Paper Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Charles F., Co., New York, N. Y.
Hinkson Paper Co., Palmer, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Narragansett Coated Paper Corp., Pawtucket, R. I.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
New England Card & Paper Co., Inc., Springfield, Mass.
Paper Affiliates Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Pyrotex Leather Co., Leominster, Mass.
Racquette River Paper Co., Potsdam, N. Y.
Reinhold-Gould, Inc., New York, N. Y.
Riegel Paper Corp., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Springfield Coated Paper Corp., Camden, N. J.
Tamm & Co., New York, N. Y.
Textileather Corp., Toledo, Ohio
United Mfg. Co., Springfield, Mass.
Whiting, C. R., Co., Inc., Hackensack, N. J.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, IMPREGNATED

Angier Corp., Framingham, Mass.
Bradner Smith & Co., Chicago, Ill.
Central Waxed Paper Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Heaphy, Charles F., Co., New York, N. Y.
Kimberly-Clark Corp., Neenah, Wis.
Marathon Corp., Menasha, Wis.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Mid-States Gummed Paper Co., Chicago, Ill.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Newark Paraffine & Parchment Paper Co., Newark, N. J.

Bold-face listings indicate advertisers in this issue

Ralston, W., & Co., Inc., Niagara Falls, N. Y.
Riegel Paper Corp., New York, N. Y.
Rogers Paper Mfg. Co., The, Manchester, Conn.
Springfield Coated Paper Corp., Camden, N. J.
Warren, S. D., Co., Boston, Mass.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Waxed Papers, Inc., Long Island City, N. Y.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PAPER, KRAFT

Blake, Moffitt & Towne, San Francisco, Calif.
Bulkley, Dunton & Co., New York, N. Y.
Butterfield-Barry Co., Inc., New York, N. Y.
Criterion Paper & Twine Co., New York, N. Y.
Crystal Tissue Co., Middletown, Ohio
Dunn Sulphite Paper Co., Port Huron, Mich.
Gaylord Container Corp., St. Louis, Mo.
Gummed Tape & Devices Co., Bklyn, N. Y.
Hubbs, Charles F. & Co., New York, N. Y.
Hummell-Ross Fibre Corp., Hopewell, Va.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Mosinee Paper Mills Co., Mosinee, Wis.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Riegel Paper Corp., New York, N. Y.
Salwen, Joe, Paper Co., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Union Bag & Paper Corp., New York, N. Y.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Yorkville Paper Co., Inc., New York, N. Y.

PAPER, LAMINATED

American Coating Mills, Inc., Elkhart, Ind.
Angier Corp., Framingham, Mass.
Arvey Corp., Jersey City, N. J.
Bulkley, Dunton & Co., New York, N. Y.
Central Waxed Paper Co., Chicago, Ill.
Chase Bag Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Criterion Paper & Twine Co., New York, N. Y.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dobeckmun Co., The, Cleveland, Ohio
Gaylord Container Corp., St. Louis, Mo.
General Felt Products, Inc., Div. Standard Cap & Seal Corp., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Charles F., Co., New York, N. Y.
Holes, Floyd A., Co., The, Bedford, Ohio
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Kimberly-Clark Corp., Neenah, Wis.
Leominster Paper Box Co., Leominster, Mass.
Loroco Industries, Inc., Reading, Ohio
Marathon Corp., Menasha, Wis.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago, Ill.
Miller Paper Co., New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
New England Card & Paper Co., Inc., Springfield, Mass.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Ralston, W., & Co., Inc., Niagara Falls, N. Y.
Rexford Paper Co., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Salwen, Joe, Paper Co., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Simon Adhesives Prods. Corp., New York, N. Y.
Sisalkraft Co., The, Chicago, Ill.
Smith, H. P., Paper Co., Chicago, Ill.
Southern Waxed Paper Co., Atlanta, Ga.
Specialty Papers Co., The, Dayton, Ohio
Springfield Coated Paper Corp., Camden, N. J.
Sweetnam, George H., Inc., Cambridge, Mass.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
United Mfg. Co., Springfield, Mass.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Waxed Papers, Inc., Long Island City, N. Y.
Westfield River Paper Co., Inc., Russell, Mass.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PAPER, MAT- OR ANTIQUE-COATED

Aldine Paper Co., New York, N. Y.
Bradner Smith & Co., Chicago, Ill.
Chicago Paper Co., Chicago, Ill.
Dejonge, Louis, & Co., New York, N. Y.
Frann Paper Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Chas. F., Co., New York, N. Y.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kupfer Bros., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
New England Card & Paper Co., Inc., Springfield, Mass.
Paper Affiliates Co., New York, N. Y.
Reinhold-Gould, Inc., New York, N. Y.
United Mfg. Co., Springfield, Mass.
Warren, S. D., Co., Boston, Mass.
Williams, Chas., W. & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, METALLIC-COATED

(Plain and Embossed)

Aldine Paper Co., New York, N. Y.
Artcote Papers, Inc., Irvington, N. J.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Chicago Paper Co., Chicago, Ill.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Criterion Paper & Twine Co., New York, N. Y.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis, & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Eureka Specialty Printing Co., Scranton, Pa.
Frann Paper Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Chas. F., Co., New York, N. Y.
Hinkson Paper Co., Palmer, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros., Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Co., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Middlesex Products Corp., Cambridge, Mass.
Miller Paper Co., New York, N. Y.
Narragansett Coated Paper Corp., Pawtucket, R. I.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
New England Card & Paper Co., Inc., Springfield, Mass.
Oxford Paper Co., New York, N. Y.
Paper Affiliates Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Pyrotex Leather Co., Leominster, Mass.
Racquette River Paper Co., Potsdam, N. Y.
Reinhold-Gould, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Springfield Coated Paper Corp., Camden, N. J.
Stevens, Nelson Paper Corp., New York, N. Y.
United Mfg. Co., Springfield, Mass.
Warren, S. D., Co., Boston, Mass
Whiting, C. R., Co., Inc., Hackensack, N. J.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.
Yorkville Paper Co., Inc., New York, N. Y.

PAPER, MICA-COATED

Aldine Paper Co., New York, N. Y.
Anderson, Geo. W., Inc., Long Island City, N. Y.
Bradner Smith & Co., Chicago, Ill.
Chicago Paper Co., Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis, & Co., New York, N. Y.
Frann Paper Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass
Nashua Gummed & Coated Paper Co., Nashua, N. H.
New England Card & Paper Co., Inc., Springfield, Mass.
Paper Affiliates, Co., New York, N. Y.
Reinhold-Gould, Inc., New York, N. Y.
Tamm & Co., New York, N. Y.
United Mfg. Co., Springfield, Mass.
Whiting, C. R., Co., Inc., Hackensack, N. J.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, MOISTURE-VAPOR RESISTANT

Angier Corp., Framingham, Mass.
Bulkley, Dunton & Co., New York, N. Y.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio

Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Criterion Paper & Twine Co., New York, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dejonge, Louis, & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Dobeckmun Co., The, Cleveland, Ohio
General Felt Products, Div. Standard Cap & Seal Corp., Bklyn, N. Y.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Chas. F., Co., New York, N. Y.
Holes, Floyd A., Co., The, Bedford, Ohio
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Keller-Dorian Corp., New York, N. Y.
Marathon Corp., Menasha, Wis.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Mosinee Paper Mills Co., Mosinee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oxford Paper Co., New York, N. Y.
Paterson Parchment Paper Co., Bristol, Pa.
Plastic Coating Corp., Holyoke, Mass.
Ralston, W., & Co., Inc., Niagara Falls, N. Y.
Rexford Paper Co., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Shawmut Waxed Paper Co., Holliston, Mass.
Shellmar Products Co., Mt. Vernon, Ohio
Sisalkraft Co., The, Chicago, Ill.
Southern Waxed Paper Co., Atlanta, Ga.
Specialty Papers Co., The, Dayton, Ohio
Sylvania Industrial Corp., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
United Mfg. Co., Springfield, Mass.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Westfield River Paper Co., Inc., Russell, Mass.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Yorkville Paper Co., Inc., New York, N. Y.

PAPER, NON-CORROSIVE

Angier Corp., Framingham, Mass.
Criterion Paper & Twine Co., New York, N. Y.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis, & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Hazen Paper Co., Holyoke, Mass.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Mosinee Paper Mills Co., Mosinee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Riegel Paper Corp., New York, N. Y.
Salwen, Joe, Paper Co., New York, N. Y.
Shellmar Products Co., Mt. Vernon, O.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Warren, S. D., Co., Boston, Mass.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PAPER, PYROXYLIN-COATED

Artcote Papers, Inc., Irvington, N. J.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Chicago Paper Co., Chicago, Ill.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Dejonge, Louis, & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Frann Paper Co., Bklyn, N. Y.
General Felt Products, Inc., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Chas. F., Co., New York, N. Y.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
McLaurin-Jones Co., Brookfield, Mass.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Miller Paper Co., New York, N. Y.
Narragansett Coated Paper Corp., Pawtucket, R. I.
Paper Affiliates Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Pyrotex Leather Co., Leominster, Mass.
Reinhold-Gould, Inc., New York, N. Y.
Riegel Paper Corp., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Tamm & Co., New York, N. Y.
Textileather Corp., Toledo, Ohio
Whiting, C. R., Co., Inc., Hackensack, N. J.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PAPER, REINFORCED

Angier Corp., Framingham, Mass.
Atlantic Gummed Paper Corp., Bklyn, N. Y.
Bradner Smith & Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Criterion Paper & Twine Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Ralston, W., & Co., Inc., Niagara Falls, N. Y.
Rinkle Krinkle Paper Co., Boston, Mass.
Sherman Paper Prods. Corp., Newton Upper Falls, Mass.
Sisalkraft Co., The, Chicago, Ill.
Thilmany Pulp & Paper Co., Kaukauna, Wis.

PAPER, TISSUE

Adams Paper Co., Wells River, Vt.
Aldine Paper Co., New York, N. Y.
American Tissue Mills, Holyoke, Mass.
Ashuelot Paper Co., Hinsdale, N. H.
Ben Mont Papers, Inc., Bennington, Vt.
Berwin Paper Corp., Dansville, N. Y.
Blake, Moffitt & Towne, San Francisco, Calif.
Brooks Paper Co., St. Louis, Mo.
Burrows Paper Corp., Little Falls, N. Y.
Central Paper Corp., Muskegon, Mich.
Chicago Printed String Co., Chicago, Ill.
Consolidated Water & Power Co., Wisconsin Rapids, Wis.
Coy Paper Co., Claremont, N. H.
Criterion Paper & Twine Co., New York, N. Y.
Crown-Willamette Paper Co., San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Detroit Sulphite & Paper Co., Detroit, Mich.
Dexter, C. H., & Sons, Inc., Windsor Locks, Conn.
Diamond Paper Mills Co., Inc., New York, N. Y.
Dunn Sulphite Paper Co., Port Huron Mich.
Earl, M. J., Co., Inc., Reading, Pa.
Economy Box & Pie Plate Co., Marion, Ind.
Eden Paper Co., Lancaster, Pa.
Erving Paper Mills, Erving, Mass.
Fernstrom Paper Mills, Inc., Pomona, Calif.
Fillmore & Slade, N. Bennington, Vt.
Flower City Tissue Mills Co., Rochester, N. Y.
Fort Howard Paper Co., Green Bay, Wis.
Frost White Paper Mills, Inc., New York, N. Y.
General Cellulose Co., Inc., The, Garwood, N. J.
Gotham Tissue Corp., New York, N. Y.
Graham Mfg. Co., Holyoke, Mass.
Hamersley Mfg. Co., Garfield, N. J.
Hawley Pulp & Paper Co., Portland, Ore.
Hoberg Paper Mills, Green Bay, Wis.
Hudson Pulp & Paper Corp., New York, N. Y.
International Paper Co., New York, N. Y.
Latimer, E., Jr., & Co., Phila., Pa.
Little Falls Paper Co., Inc., Newburgh, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McIntyre Bros. Paper Co., Inc., Fayetteville, N. Y.
Minerva Wax Paper Co., Minerva, Ohio
Mohawk Valley Paper Co., Inc., Little Falls, N. Y.
Moyer & Pratt, Inc., Lyons Falls, N. Y.
North American Pulp & Paper Co., New York, N. Y.
North End Paper Co., Fulton, N. Y.
Northern Paper Mills, Green Bay, Wis.
Oswego River Paper Mills, Phoenix, N. Y.
Pacific Coast Paper Mills, Bellingham, Wash.
Peerless Paper Mills, Inc., Oaks, Pa.
Pequannock Valley Paper Co., Butler, N. J.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Reed Tissues Corp., Little Falls, N. Y.
River Valley Tissue Mills, Inc., Phoenix, N. Y.
Robertson Co., The, Hinsdale, N. H.
Robertson, G. E. & Co., Hinsdale, N. H.
Rondout Paper Mills, Inc., Napanoch, N. Y.
Rushmore Paper Mills, Inc., Natural Dam, N. Y.
Russell Products Co., Phila., Pa.
Salwen, Joe, Paper Co., New York, N. Y.
Sanitary Paper Mills, Inc., East Hartford Conn.
Senoso Paper Co., Inc., Phoenix, N. Y.
Smith Paper, Inc., Lee, Mass.
Southern Waxed Paper Co., Atlanta, Ga.
Stevens & Thompson Paper Co., Greenwich, N. Y.
Sweet Bros. Paper Mfg. Co., Phoenix, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Tissue Co., Saugerties, N. Y.
Tuttle Press Co., The, Appleton, Wis.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Victoria Paper Mills Co., Fulton, N. Y.
Warren, S. D., Co., Boston, Mass.
Waterproof Paper & Board Co., Cincinnati, Ohio
Waxed Papers, Inc., Long Island City, N. Y.
Weber Supply Co., Momence, Ill.
White River Paper Mills, Inc., Indianapolis, Ind.
White-Washburn Co., Inc., Hinsdale, N. H.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wisconsin Tissue Mills, Menasha, Wis.

PAPER, TRADEMARKED

Aldine Paper Co., New York, N. Y.
Anderson, Geo. W., Inc., Long Island City, N. Y.
Blake, Moffitt & Towne, San Francisco, Calif.

Bradner Smith & Co., Chicago, Ill.
Chicago Paper Co., Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis, & Co., New York, N. Y.
District of Columbia Paper Mills, Inc., Washington, D. C.
Dobeckmun Co., The, Cleveland, Ohio
Fitchburg Paper Co., Fitchburg, Mass.
Frann Paper Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen, Paper Co., Holyoke, Mass.
Heaphy, Chas. F., Co., New York, N. Y.
Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Kupfer Bros. Paper Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
New England Card & Paper Co., Inc., Springfield, Mass.
Pejepscot Paper Co., New York, N. Y.
Plastic Coating Corp., Holyoke, Mass.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Racquette River Paper Co., Potsdam, N. Y.
Royal Paper Corp., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Springfield Coated Paper Corp., Camden, N. J.
Sylvania Industrial Corp., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
United Mfg. Co., Springfield, Mass.
Westfield River Paper Co., Inc., Russell, Mass.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, VEGETABLE PARCHMENT

Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Riegel Paper Corp., New York, N. Y.

PAPER, VELOUR

(Plain, Printed, and Embossed)

Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Cellusuede Products, Inc., Rockford, Ill.
Dejonge, Louis, & Co., New York, N. Y.
District of Columbia Paper Mills, Inc., Washington, D. C.
Frann Paper Co., Bklyn, N. Y.
Hughes & Hoffman, New York, N. Y.
Kaplan Textile & Prods., Inc., New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Matthias Paper Corp., Phila., Pa.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PAPER, WATERPROOF

Angier Corp., Framingham, Mass.
Atlantic Gummed Paper Corp., Bklyn, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Blake, Moffitt & Towne, San Franscisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Bulkley, Dunton & Co., New York, N. Y.
Central Waxed Paper Co., Chicago, Ill.
Chase Bag Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Criterion Paper & Twine Co., New York, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis, & Co., New York, N. Y.
Frann Paper Co., Bklyn, N. Y.
General Felt Products, Div. Standard Cap & Seal Corp., Bklyn, N. Y.
Gummed Tape & Devices Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Chas. F., Co., New York, N. Y.
Henle Wax Paper Mfg. Co., Inc., The, New York, N. Y.
Holes, Floyd A., Co., The, Bedford, Ohio
Hughes & Hoffman, New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Middlesex Products Corp., Cambridge, Mass.
Mid-States Gummed Paper Co., Chicago, Ill.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Pyrotex Leather Co., Leominster, Mass.
Ralston, W., & Co., Inc., Niagara Falls, N. Y.
Rexford Paper Co., Milwaukee, Wis.
Riegel Paper Corp., New York, N. Y.
Salwen, Joe, Paper Co., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Sherman Paper Prods. Corp., Newton Upper Falls, Mass.
Sisalkraft Co., The, Chicago, Ill.
Specialty Papers Co., The, Dayton, Ohio
Thilmany Pulp & Paper Co., Kaukauna Wis.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
United Mfg. Co., Springfield, Mass.
Waxed Papers, Inc., Long Island City, N. Y.
Williams, Chas. W., & Co., Inc., New York, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, WAXED

American Tissue Mills, Holyoke, Mass.
Arvey Corp., Jersey City, N. J.
Ben Mont Papers, Inc., Bennington, Vt.
Blake, Moffitt & Towne, San Francisco, Calif.
Central Waxed Paper Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Criterion Paper & Twine Co., New York, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Crystal Tissue Co., Middletown, Ohio
Deerfield Glassine Co., Monroe Bridge, Mass.
Dejonge, Louis, & Co., New York, N. Y.
Dixie Wax Paper Co., Inc., Dallas, Texas
General Felt Products, Div. Standard Cap & Seal Corp., Bklyn, N. Y.
Hamersley Mfg. Co., The, Garfield, N. J.
Henle Wax Paper Mfg. Co., Inc., The, New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Marathon Corp., Menasha, Wis.
Marvellum Co., The, Holyoke, Mass.
Milprint, Inc., Milwaukee, Wis.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Riegel Paper Corp., New York, N. Y.
Shawmut Waxed Paper Co., Holliston, Mass.
Smith, H. P., Paper Co., Chicago, Ill.
Southern Waxed Paper Co., Atlanta, Ga.
Specialty Papers Co., The, Dayton, Ohio
Sweetnam, George H., Inc., Cambridge, Mass.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
Waterproof Paper & Board Co., Cincinnati, Ohio
Waxed Papers, Inc., Long Island City, N. Y.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PAPER, WET STRENGTH

Blake, Moffitt & Towne, San Francisco, Calif.
Bulkley, Dunton & Co., New York, N. Y.
Criterion Paper & Twine Co., New York, N. Y.
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dennison Mfg. Co., Framingham, Mass.
Detroit Sulphite Pulp & Paper Co., Detroit, Mich.
Dunn Sulphite Paper Co., Port Huron, Mich.
Fitchburg Paper Co., Fitchburg, Mass.
Gaylord Container Corp., St. Louis, Mo.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Chas. F., Co., New York, N. Y.
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Marathon Corp., Menasha, Wis.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oxford Paper Co., New York, N. Y.
Paterson Parchment Paper Co., Bristol, Pa.
Riegel Paper Corp., New York, N. Y.
Sisalkraft Co., The, Chicago, Ill.
Specialty Papers Co., The, Dayton, Ohio
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Union Bag & Paper Corp., New York, N. Y.
Warren, S. D., Co., Boston, Mass.
Waxed Papers, Inc., Long Island City, N. Y.
Westfield River Paper Co., Inc., Russell, Mass.
Williams, Chas. W. & Co., Inc., New York, N. Y.

PAPER, WOOD VENEER

(Imitation)

Aldine Paper Co., New York, N. Y.
Anderson, George W., Inc., Long Island City, N. Y.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Central Waxed Paper Co., Chicago, Ill.
Chicago Paper Co., Chicago, Ill.
Dejonge, Louis, & Co., New York, N. Y.
District of Columbia Paper Mills, Inc., Washington, D. C.
Frann Paper Co., Bklyn, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Chas. F., New York, N. Y.
Hinkson Paper Co., Palmer, Mass.

Holyoke Card & Paper Co., Springfield, Mass.
Hughes & Hoffman, New York, N. Y.
Keller-Dorian Corp., New York, N. Y.
Kupfer Bros. Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Middlesex Products Corp., Cambridge, Mass.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Paper Affiliates Co., New York, N. Y.
Racquette River Paper Co., Potsdam, N. Y.
Reinhold-Gould, Inc., New York, N. Y.
Royal Paper Corp., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Springfield Coated Paper Corp., Camden, N. J.
Stecher-Traung Litho. Corp., San Francisco, Calif.
Stevens, Nelson Paper Corp., New York, N. Y.
Tamm & Co., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
United Mfg. Co., Springfield, Mass.
Whiting, C. R., Co., Inc., Hackensack, N. J.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PAPER, WRAPPING

(Fancy Tissue)

Aldine Paper Co., Inc., New York, N. Y.
Anderson, Geo. W., Inc., Long Island City, N. Y.
American Tissue Mills, Holyoke, Mass.
Ben Mont Papers, Inc., Bennington, Vt.
Bradner Smith & Co., Chicago, Ill.
Chicago Paper Co., Chicago, Ill.
Chicago Printed String Co., Chicago, Ill.
Criterion Paper & Twine Co., New York, N. Y.
Crown Zellerbach Corp., San Francisco Calif.
Crystal Tissue Co., Middletown, Ohio
Decotone Products, Div. Fitchburg Paper Co., Fitchburg, Mass.
Dejonge, Louis & Co., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Detroit Sulphite Pulp & Paper Co., Detroit, Mich.
Dunn Sulphite Paper Co., Port Huron, Mich.
Du-Tone Ribbon Corp., New York, N. Y.
Fernstrom Paper Mills, Inc., Pomona, Calif.
Gala Giftwraps & Specialties, Inc., New York, N. Y.
Hampden Glazed Paper & Card Co., Holyoke, Mass.
Hazen Paper Co., Holyoke, Mass.
Heaphy, Chas. F., Co., New York, N. Y.
Kupfer Bros. Paper Co., New York, N. Y.
Marvellum Co., The, Holyoke, Mass.
Matthias Paper Corp., Phila., Pa.
Moyer & Pratt, Inc., Lyons Falls, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Pejepscot Paper Co., New York, N. Y.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Riegel Paper Corp., New York, N. Y.
Rondout Paper Mills, Inc., Napanoch, N. Y.
Royal Paper Corp., New York, N. Y.
Springfield Coated Paper Corp., Camden, N. J.
Stevens, Nelson Paper Corp., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Tuttle Press Co., The, Appleton, Wis.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Williams, Chas. W., & Co., Inc., New York, N. Y.

PARTITIONS

Andrews, O. B., Co., Chattanooga, Tenn.
Freedman, Wm. A., Die Cutters, New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Globe Paper Box Co., Chicago, Ill.
Hope Paper Box Co., Providence, R. I.
Inman Mfg. Co., Inc., Amsterdam, N. Y.
Keyes Fibre Co., Waterville, Me.
Kress, F. J. Box Co., Pittsburgh, Pa.
Loroco Industries, Inc., Reading, Ohio
Mason Box Co., The, Attleboro, Mass.
National Metal Edge Box Co., Phila., Pa.
Ross Paper Box Co., New York, N. Y.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sweetnam, George H., Inc., Cambridge, Mass.
Traver Corp., Chicago, Ill.

PLASTIC MATERIALS, ACRYLATE & METHACRYLATE

Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Rohm & Haas Co., Inc., Phila., Pa.

PLASTIC MATERIALS, ALLYL

Marco Chemicals, Sewaren, N. J.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Pittsburgh Plate Glass Co., Columbia Chem. Div., Pittsburgh, Pa.

PLASTIC MATERIALS, CASEIN

American Plastics Corp., New York, N. Y.
Morrell, George, Corp., Muskegon Heights, Mich.
National Casein Sales, Chicago, Ill.

PLASTIC MATERIALS, CAST PHENOLIC

Bakelite Corp., New York, N. Y.
Catalin Corp., New York, N. Y.
Durez Plastics & Chemicals, Inc., N. Tonawanda, N. Y.
Irvington Varnish & Insulator Co., Irvington, N. J.
Knoedler, A., Co., Lancaster, Pa.
Marblette Corp., Long Island City, N. Y.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.

PLASTIC MATERIALS, CELLULOSE ACETATE

Bakelite Corp., New York, N. Y.
Celanese Plastics Corp., New York, N. Y.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Eastman Kodak Co., Rochester, N. Y.
Hercules Powder Co., Inc., Wilmington, Del.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nixon Nitration Works, Nixon, N. J.
Tennessee Eastman Corp., Kingsport, Tenn.

PLASTIC MATERIALS, CELLULOSE ACETATE BUTYRATE

Tennessee Eastman Corp., Kingsport, Tenn.

PLASTIC MATERIALS, CELLULOSE NITRATE (PYROXYLIN)

Celanese Plastics Corp., New York, N. Y.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.
Eastman Kodak Co., Rochester, N. Y.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nixon Nitration Works, Nixon, N. J.

PLASTIC MATERIALS, ETHYL CELLULOSE

Celanese Plastics Corp., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Nixon Nitration Works, Nixon, N. J.

PLASTIC MATERIALS, MELAMINE

American Cyanamid Co., Plastics Div., New York, N. Y.
Catalin Corp., New York, N. Y.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio

PLASTIC MATERIALS, PHENOLIC

American Resinous Chemicals Corp., Peabody, Mass.
Bakelite Corp., New York, N. Y.
Catalin Corp., New York, N. Y.
Durez Plastics & Chemicals, Inc., N. Tonawanda, N. Y.
Durite Plastics, Inc., Phila., Pa.
Heresite & Chemicals Co., Manitowoc, Wis.
Irvington Varnish & Insulator Co., Irvington, N. J.
Makalot Corp., Boston, Mass.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Reilly Tar & Chemical Corp., Indianapolis, Ind.
Synvar Corp., Wilmington, Del.
Varcum Chemical Corp., Niagara Falls, N. Y.

PLASTIC MATERIALS, POLYAMIDE

(Nylon)

Du Pont de Nemours, E. I. & Co., Inc. Wilmington, Del.

PLASTIC MATERIALS, POLYETHYLENE

Bakelite Corp., New York, N. Y.
Du Pont de Nemours, E. I. & Co., Inc., Wilmington, Del.

PLASTIC MATERIALS, STYRENE

Bakelite Corp., New York, N. Y.
Catalin Corp., New York, N. Y.
Chemaco Corp., Berkeley Heights, N. J.
Dow Chemical Co., The, Midland, Mich.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nixon Nitration Works, Nixon, N. J.

PLASTIC MATERIALS, UNSATURATED-POLYESTER

Monsanto Chemical Co., Plastics Div., Springfield, Mass.

PLASTIC MATERIALS, UREA

American Cyanamid Co., Plastics Div., New York, N. Y.
American Resinous Chemicals Corp., Peabody, Mass.
Bakelite Corp., New York, N. Y.
Makalot Corp., Boston, Mass.
Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio
Synvar Corp., Wilmington, Del.

PLASTIC MATERIALS, VINYL ALCOHOL

Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.

PLASTIC MATERIALS, VINYL ACETATE

Bakelite Corp., New York, N. Y.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
National Transparent Plastics Co., Springfield, Mass.

PLASTIC MATERIALS, VINYL BUTYRAL

Bakelite Corp., New York, N. Y.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.

PLASTIC MATERIALS, VINYL CHLORIDE

Bakelite Corp., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Goodrich, B. F., Co., Cleveland, Ohio

PLASTIC MATERIALS, VINYL CHLORIDE ACETATE

Bakelite Corp., New York, N. Y.
Carbide & Carbon Chemicals Corp., Plastics Div., New York, N. Y.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Union Carbide & Carbon Corp., New York, N. Y.

PLASTIC MATERIALS, VINYLIDENE CHLORIDE

Dow Chemical Co., The, Midland, Mich.

RIBBONS & TIES, COTTON

Chicago Printed String Co., Chicago, Ill.
Dennison Mfg. Co., Framingham, Mass.
Economy Novelty & Printing Co., New York, N. Y.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.
Stark Bros. Ribbon Co., New York, N. Y.
Taffel Bros., Inc., New York, N. Y.
W-E-R Ribbon Corp., New York, N. Y.

RIBBONS & TIES, RAYON

Artistic Flower Co., New York, N. Y.
Buser, R. G., Corp., Paterson, N. J.
Century Ribbon Mills, New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Du-Tone Ribbon Corp., New York, N. Y.
Economy Novelty & Printing Co., New York, N. Y.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.
General Ribbon Mills, Catasauqua, Pa.
Ketcham, Howard, Inc., New York, N. Y.
Stark Bros. Ribbon Co., New York, N. Y.
Taffel Bros., Inc., New York, N. Y.
Welwood, John C., Corp., New York, N. Y.
W-E-R Ribbon Corp., New York, N. Y.
Wright, Wm. E., & Sons Co., West Warren, Mass.

RIBBONS & TIES, TRANSPARENT

Dennison Mfg. Co., Framingham, Mass.
Du-Tone Ribbon Corp., Chicago, Ill.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Shellmar Products Co., Mt. Vernon, Ohio
Stark Bros. Ribbon Co., New York, N. Y.
Taffel Bros., Inc., New York, N. Y.
Walser Mfg. Co., Inc., The, Clifton, N. J.
W-E-R Ribbon Corp., New York, N. Y.

ROLL LEAF, STAMPING FOIL

Coughlin Mfg. Co., New York, N. Y.
Griffin, Campbell, Hayes, Walsh, Inc., New York, N. Y.
Krause, Richard M., Inc., New York, N. Y.
Markem Machine Co., Keene, N. H.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Peerless Roll Leaf Co., Inc., Union City, N. J.

RUBBER, SPONGE

(Protective Wadding)

Sponge Rubber Prods. Co., The, Shelton, Conn.

SEALS

(Embossed on Paper, Foil, Etc.)

(See also Closures, Secondary)

Attleboro Printing & Embossing Co., Attleboro, Mass.
Bartlett Label Co., Kalamazoo, Mich.
Cameo Die & Label Co., New York, N. Y.
Chaspec Mfg. Co., New York, N. Y.
Chicago Printed String Co., Chicago, Ill.
Consolidated Lithographing Corp., Bklyn, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Ever Ready Label Corp., New York, N. Y.
Fenton Label Co., Phila., Pa.
Fitzhugh, Wm. W., Inc., Bklyn, N. Y.
Foxon Co., The, Providence, R. I.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Grand Rapids Label Co., Grand Rapids, Mich.
Kaumagraph Co., Wilmington, Del.
Krause, Richard M., Inc., New York, N. Y.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Lehmann Printing & Litho. Co., San Francisco, Calif.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Milwaukee Label & Seal Co., Milwaukee, Wis.
Muirson Label Co., Inc., Bklyn, N. Y.
Nalco, Inc., New York, N. Y.
Pacific Label Co., Los Angeles, Calif.
Pollock Paper & Box Co., Dallas, Texas
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Reynolds Metals Co., Richmond, Va.
St. Louis Sticker Co., St. Louis, Mo.
Tablet & Ticket Co., The, Chicago, Ill.
Tompkins' Label Service, Phila., Pa.
Unique Printed Products Co., Inc., Terre Haute, Ind.
Wheeler-Van Label Co., Grand Rapids, Mich.
Wynekoop, Walker, Co., Chicago, Ill.

SHEETING, TRANSPARENT RIGID

Carbide & Carbon Chemicals Corp., Plastics Div., New York, N. Y.
Celanese Plastics Corp., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Eastman Kodak Co., Rochester, N. Y.
Great American Plastics Co., Leominster, Mass.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Price, M. B., Associates, New York, N. Y.
Union Carbide & Carbon Corp., New York, N. Y.

STAPLES, WIRE

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bates Mfg. Co., The, New York, N. Y.
Bostitch, Inc., East Greenwich, R. I.
Grammes, L. F. & Sons, Inc., Allentown, Pa.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
International Staple & Machine Co., Clifton Heights, Pa.
Paslode Co., Chicago, Ill.
Signode Steel Strapping Co., Chicago, Ill.

STENCIL BOARD

(Oiled & Unoiled)

Bradley, A. J., Mfg. Co., Long Island City, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Garvey Fountain Ink & Brush Co., St. Louis, Mo.
Gottscho, Adolph, Inc., New York, N. Y.
Hewitt, C. B., & Bros., Inc., New York, N. Y.
Hummel-Ross Fibre Corp., Hopewell, Va.
Ideal Stencil Machine Co., Belleville, Ill.
Marsh Stencil Machine Co., Belleville, Ill.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Matthias Paper Corp., Phila., Pa.
Metal Marker Mfg. Co., Cleveland, Ohio
National Waterproofing Co., Camden, N. J.
Nobel & Westbrook Mfg. Co., The, E. Hartford, Conn.
O'Malley, M. J., Co., Springfield, Mass.
Riegel Paper Corp., New York, N. Y.
Schwerdtle Stamp Co., Bridgeport, Conn.

STOPPERS, RUBBER

Armstrong Cork Co., Lancaster, Pa.
United States Rubber Co., New York, N. Y.

STRAPPING, FIBRE

Acme Steel Co., Chicago, Ill.

STRAPPING, STEEL

Acme Steel Co., Chicago, Ill.
Gerrard Steel Strapping Co., Chicago, Ill.
Signode Steel Strapping Co., Chicago, Ill.
Stanley Works, The, New Britain, Conn.

STRING, PRINTED

(Plain and Decorative)

Chicago Printed String Co., Chicago, Ill.
Economy Novelty & Printing Co., New York, N. Y.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.

TAGS

Attleboro Ptg. & Embossing Co., Attleboro, Mass.
Bradner Smith & Co., Chicago, Ill.
Cameo Die & Label Co., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Dennison Mfg. Co., Framingham, Mass.
Disbrow Mfg. Co., Newark, N. J.
Economy Novelty Co., New York, N. Y.
Fox, C. J., Co., The, Providence, R. I.
Foxon Co., The, Providence, R. I.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Kaumagraph Co., Wilmington, Del.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pollock Paper & Box Co., Dallas, Texas
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Robinson Tag & Label Co., New York, N. Y.

Addresses of companies listed appear on pages 945–955

Salisbury Mfg. Co., Central Falls, R. I.
Sterling Offset Co., New York, N. Y.
Tablet & Ticket Co., The, Chicago, Ill.
Talmadge Printing Co., New York, N. Y.
Tompkins' Label Service, Phila., Pa.
Weber Addressing Machine Co., Chicago, Ill.

TAPE, CELLULOSE

Crystal Transparent Mfg. Co., Inc., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.
Gummed Tape & Devices Co., Bklyn, N. Y.
Industrial Tape Corp., New Brunswick, N. J.
International Plastic Corp., Morristown, N. J.
Milprint, Inc., Milwaukee, Wis.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Sylvania Industrial Corp., New York, N. Y.
Tower Envelope Co., New York, N. Y.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Walser Mfg. Co., Inc., The, Clifton, N. J.

TAPE, COTTON

Chicago Printed String Co., Chicago, Ill.
Fibre Cord Co., New York, N. Y.
Freydberg Bros.-Strauss, Inc., New York, N. Y.
Industrial Tape Corp., New Brunswick, N. J.

TAPE, GUMMED

Atlantic Gummed Paper Corp., Bklyn, N. Y.
Blake, Moffitt & Towne, San Francisco, Calif.
Bradner Smith & Co., Chicago, Ill.
Central Paper Co., Menasha, Wis.
Chicago Gum Tape Co., Chicago, Ill.
Crowell Corp., The, Yorklyn, Del.
Crown, Zellerbach Corp., San Francisco, Calif.
Dennison Mfg. Co., Framingham, Mass.
Disbrow Mfg. Co., Newark, N. J.
Economy Novelty & Printing Co., New York, N. Y.
Ever Ready Label Corp., New York, N. Y.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Gates Paper Co. Ltd., The, Los Angeles, Calif.
Gummed Products Co., The, Troy, Ohio
Gummed Tape & Devices Co., Bklyn, N. Y.
Inland Container Corp., Indianapolis, Ind.
Knowlton, M. D., Co., Rochester, N. Y.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago, Ill.
Miller & Miller, Atlanta, Ga.
Nashua Package Sealing Co., Nashua, N. H.
Pollock Paper & Box Co., Dallas, Texas
Rexford Paper Co., Milwaukee, Wis.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Salwen, Joe, Paper Co., New York, N. Y.
Tanglefoot Co., The, Grand Rapids, Mich.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.

TAPE, HEAT SEALING

Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Gordon-Lacey Chemical Prods. Co., Maspeth, L. I., N. Y.
Irvington Varnish & Insulator Co., Irvington, N. J.
Mid-States Gummed Paper Co., Chicago, Ill.
Miller & Miller, Atlanta, Ga.
Tompkins' Label Service, Phila., Pa.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.

TAPE, PRESSURE SENSITIVE

(Self-Sealing)

Bauer & Black Div. of The Kendall Co., Chicago, Ill.
Dennison Mfg. Co., Framingham, Mass.
Ever Ready Label Corp., New York, N. Y.
Gummed Tape & Devices Co., Bklyn, N. Y.
Industrial Tape, Corp., New Brunswick, N. J.
International Plastic Corp., Morristown, N. J.
Milprint, Inc., Milwaukee, Wis.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.

TAPE, WATER RESISTANT

Atlantic Gummed Paper Corp., Bklyn, N. Y.
Bauer & Black Div. of The Kendall Co., Chicago, Ill.
Central Paper Co., Menasha, Wis.
Gummed Products Co., The, Troy, Ohio
Gummed Tape & Devices Co., Bklyn, N. Y.
Industrial Tape Corp., New Brunswick, N. J.
International Plastic Corp., Morristown, N. J.
Matthias Paper Corp., Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago, Ill.
Reynolds Metal Co., Richmond, Va.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
United States Rubber Co., New York, N. Y.

TAPE, WIRE REINFORCED

Germain's, Los Angeles, Calif.

TINPLATE

Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, Ohio

TRANSPARENT FILMS, CELLOPHANE

Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Sylvania Industrial Corp., New York, N. Y.

TRANSPARENT FILMS, CELLULOSE ACETATE

American Products Mfg. Co., New Orleans, La.
Celanese Plastics Corp., New York, N. Y.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Eastman Kodak Co., Rochester, N. Y.
Great American Plastics Co., Leominster, Mass.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nixon Nitration Works, Nixon, N. J.

TRANSPARENT FILMS, ETHYL CELLULOSE

American Prods. Mfg. Co., New Orleans, La.
Celanese Plastics, Corp., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.

TRANSPARENT FILMS, GLASSINE

(Lacquer-Coated)

Rhinelander Paper Co., Rhinelander, Wis.
Riegel Paper Corp., New York, N. Y.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
Westfield River Paper Co., Inc., Russell, Mass.

TRANSPARENT FILMS, LATEX FOR WRAPPING FROZEN FOODS

Dewey & Almy Chemical Co., Cambridge, Mass.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
United States Rubber Co., New York, N. Y.

TRANSPARENT FILMS, POLYETHYLENE

Bakelite Corp., New York, N. Y.
Visking Corp., The, Chicago, Ill.

TRANSPARENT FILMS, RUBBER HYDROCHLORIDE

Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Goodyear Tire & Rubber Co., The, Akron, Ohio

TRANSPARENT FILMS, VINYL ACETATE

Bakelite Corp., New York, N. Y.
Carbide & Carbon Chemicals Corp., New York, N. Y.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.

TRANSPARENT FILMS, VINYL ALCOHOL

Du Pont de Nemours, E. I., & Co., Inc. Wilmington, Del.

TRANSPARENT FILMS, VINYL BUTYRAL

Bakelite Corp., New York, N. Y.
Du Pont de Nemours, E. I., & Co., Inc. Wilmington, Del.
Monsanto Chemical Co., Plastics Div., Springfield, Mass.

TRANSPARENT FILMS, VINYL CHLORIDE

Bakelite Corp., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Goodyear Tire & Rubber Co., The, Akron, Ohio
Visking Corp., The, Chicago, Ill.

TRANSPARENT FILMS, VINYL CHLORIDE ACETATE

Bakelite Corp., New York, N. Y.
Celanese Plastics Corp., New York, N. Y.
Goodyear Tire & Rubber Co., The, Akron, Ohio
Visking Corp., The, Chicago, Ill.

TRANSPARENT FILMS, VINYLIDENE CHLORIDE

Carbide & Carbon Chemicals Corp., Plastics Div., New York, N. Y.
Dow Chemical Co., The, Midland, Mich.

TUBE CLIPS

Colton, Arthur, Co., Detroit, Mich.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
New England Collapsible Tube Co., Chicago, Ill.
Standard Specialty & Tube Co., New Brighton, Pa.

TUBING, GLASS

(See Glass, Rod & Tubing)

Bold-face listings indicate advertisers in this issue

VARNISHES & LACQUERS

(See Coatings, Protective)

WADDING

(See Padding & Wadding)

WAX, COATING & SEALING

American Resinous Chemicals Corp., Peabody, Mass.
Bareco Oil Co., Tulsa, Okla.
Dewey & Almy Chemical Co., Cambridge, Mass.
Glyco Products Co., Inc., Bklyn, N. Y.
Goodyear Tire & Rubber Co., The, Akron, Ohio
Houghton, E. F., & Co., Phila., Pa.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Natl. Oil Products Co., Harrison, N. J.
Non-Rust Corp., Chicago, Ill.
Petroleum Specialties, Inc., New York, N.Y.
Petrolite Corp., Wax Div., New York, N. Y.
Powers Products, Inc., Chicago, Ill.
Pyroxylin Products, Inc., Chicago, Ill.
Socony-Vacuum Oil Co., Inc., New York, N. Y.
Specialty Papers Co., The, Dayton, Ohio
Zophar Mills, Inc., Bklyn, N. Y.

WIRE, REINFORCEMENT

Acme Steel Co., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Gerrard Steel Strapping Co., Chicago, Ill.
Harris-Seybold-Potter Co., Dayton, Ohio

WIRE, STAPLING

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bates Mfg. Co., The, New York, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Bostitch, Inc., E. Greenwich, R. I.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
International Staple & Machine Co., Clifton Heights, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Paslode Co., Chicago, Ill.
Prentiss, George W., & Co., Holyoke, Mass.

WIRE, STITCHING

Acme Steel Co., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Bostitch, Inc., E. Greenwich, R. I.
Dexter Folder Co., Pearl River, N. Y.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
Ideal Stitcher & Mfg. Co., Racine, Wis.
International Staple & Machine Co., Clifton Heights, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Paslode Co., Chicago, Ill.
Prentiss, George W., & Co., Holyoke, Mass.

WIRE, STITCHING, COLORED

Acme Steel Co., Chicago, Ill.
Bostitch, Inc., E. Greenwich, R. I.
Harris-Seybold-Potter Co., Dayton, Ohio

WRAPPERS

(See Labels & Wrappers)

WRAPPINGS

Ben Mont Papers, Inc., Bennington, Vt.
Bradner Smith & Co., Chicago, Ill.
Chicago Printed String Co., Chicago, Ill.
Crystal Transparent Corp., New York, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Dobeckmun Co., The, Cleveland, Ohio
Kaumagraph Co., Wilmington, Del.
Matthias Paper Corp., Phila., Pa.
National Water-Proofing Co., Camden, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Riegel Paper Corp., New York, N. Y.
Roesch, Louis, Co., San Francisco, Calif.
Royal, Thomas M., & Co., Phila., Pa.
Shellmar Products Co., Mt. Vernon, Ohio
Stecher-Traung Litho. Corp., Rochester, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.

Container Manufacturers Section

AMPOULES, GLASS

Glass Industries, Inc., New York, N. Y.
Kimble Glass Co., Vineland, N. J.
Price, M. B., Associates, New York, N. Y.
Wheaton, T. C., Co., Millville, N. J.

BAGS, ANTI-TARNISH
(Cloth and Cotton-Lined Paper)

Andrews, P. L., Corp., Bklyn, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Cottonluxe Mfg. Co., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Eureka Mfg. Co., Inc., Taunton, Mass.
Modern Containers, Inc., Los Angeles, Calif.
National Transparent Plastics Co., Springfield, Mass.
Paramount Paper Products Co., Inc., Phila., Pa.
U. S. Envelope Co., Springfield, Mass.
Varey-Shea Bag Corp., Elizabeth, N. J.

BAGS, COMBINATION

Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C., Co., Devon, Pa.
Central States Paper & Bag Co., St. Louis, Mo.
Comet Envelope & Paper Co., New York, N. Y.
Continental Bag Specialties Corp., New York, N. Y.
Crystal Transparent Mfg. Co., Inc., New York, N. Y.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Interstate Folding Box Co., Middletown, Ohio
Marathon Corp., Menasha, Wis.
Mason Envelope Co., New York, N. Y.
Mehl Mfg. Co., Cincinnati, Ohio
Milprint, Inc., Milwaukee, Wis.
Neostyle, Inc., Chicago, Ill.
Newark Glassine Bag Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Reynolds Metals Co., Richmond, Va.
Royal, Thomas M., & Co., Phila., Pa.
Stecher-Traung Litho. Corp., Rochester, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Tower Envelope Co., New York, N. Y.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
Weber, H. G., & Co., Inc., Kiel, Wis.

BAGS, FOIL

Bemis Bro. Bag Co., St. Louis, Mo.
Continental Bag Specialties Corp., New York, N. Y.
Cromwell Paper Co., Chicago, Ill.
Cupples-Hesse Corp., St. Louis, Mo.
Dobeckmun Co., The, Cleveland, Ohio
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind.
Mehl Mfg. Co., Cincinnati, Ohio
Milprint, Inc., Milwaukee, Wis.
Moist-R-Proof Container Co., San Francisco, Calif.
Munson Bag Co., The, Cleveland, Ohio
Neostyle, Inc., Chicago, Ill.
Newark Glassine Bag Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Royal, Thomas M., & Co., Phila., Pa.
Shellmar Products Co., Mt. Vernon, Ohio
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
U. S. Envelope Co., Springfield, Mass.

BAGS, GLASSINE & WAXED

American Paper Goods Co., The, Kensington, Conn.
Arkell & Smiths, Canajoharie, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C., Co., Devon, Pa.
Central States Paper & Bag Co., St. Louis, Mo.
Central Waxed Paper Co., Chicago, Ill.
Comet Envelope & Paper Co., Inc., New York, N. Y.
Continental Bag Specialties Corp., New York, N. Y.
Cromwell Paper Co., Chicago, Ill.
Cupples-Hesse Corp., St. Louis, Mo.
Disbrow Mfg. Co., Inc., Newark, N. J.
Dixie Wax Paper Co., Inc., Dallas, Texas
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Herz, Alexander Co., Inc., New York, N. Y.
Interstate Folding Box Co., The, Middletown, Ohio
Marathon Corp., Menasha, Wis.
Mason Envelope Co., New York, N. Y.
Mehl Mfg. Co., Cincinnati, Ohio
Milprint, Inc., Milwaukee, Wis.
Modern Containers, Inc., Los Angeles, Calif.
Moser Bag & Paper Co., The, Cleveland, Ohio
Munson Bag Co., Cleveland, Ohio
Neostyle, Inc., Chicago, Ill.
Newark Glassine Bag Co., Newark, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Pollock Paper & Box Co., Dallas, Texas
Royal, Thomas M., & Co., Phila., Pa.
St. Regis Paper Co., New York, N. Y.
Schorsch & Co., Inc., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Tower Envelope Co., New York, N. Y.

Addresses of companies listed appear on pages 945–955

Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
U. S. Envelope Co., Springfield, Mass.
Waxed Papers, Inc., Long Island City, N. Y.
Wolf Bros., Phila., Pa.
Yorkville Paper Co., Inc., New York, N. Y.

BAGS, GLASSINE-LAMINATED & DUPLEX

American Paper Goods Co., The, Kensington, Conn.
Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C., Co., Devon, Pa.
Continental Bag Specialties Corp., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Disbrow Mfg. Co., Newark, N. J.
Dobeckmun Co., The, Cleveland, Ohio
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Marathon Corp., Menasha, Wis.
Mehl Mfg. Co., Cincinnati, Ohio
Milprint, Inc., Milwaukee, Wis.
Moser Bag & Paper Co., The, Cleveland, Ohio
Neostyle, Inc., Chicago, Ill.
Newark Glassine Bag Co., Newark, N. J.
Ohio Boxboard Co., The, Rittman, Ohio
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Royal, Thomas M., & Co., Phila., Pa.
Schorsch & Co., Inc., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Tower Envelope Co., New York, N. Y.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.
Westfield River Paper Co., Inc., Russell, Mass.
Yorkville Paper Co., Inc., New York, N. Y.

BAGS, KRAFT, GROCERY

Atlanta Paper Co., Atlanta, Ga.
Birmingham Paper Co., Birmingham, Ala.
Brooklyn Standard Bag Corp., New York, N. Y.
Consolidated Paper Bag Co., Somerville, Mass.
Crown-Willamette Paper Co., San Francisco, Calif.
Crunden, Martin, Mfg. Co., St. Louis, Mo.
Cupples Co., St. Louis, Mo.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Glickman, L., & Co., Bklyn, N. Y.
Interstate Bag Co., Walden, N. Y.
Kraft Bag Corp., New York, N. Y.
Lenoir Pad & Paper Co., Lenoir, N. C.
Pine-Land Bag Corp., Inc., Pascagoula, Miss.
Raymond Bag Co., Middletown, Ohio
St. Regis Paper Co., New York, N. Y.
Schorsch & Co., Inc., New York, N. Y.
Security Bag Co., The (Lockland), Cincinnati, Ohio
Seinsheimer Paper Corp., Cincinnati, Ohio
Stevens, C. E., Bros., Inc., Baltimore, Md.
Superior-Lawrence Bag Co., Inc., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Triangle Paper Bag Co., Covington, Ky.
Triangle Paper Bag Mfg. Co., Cincinnati, Ohio
Union Bag & Paper Corp., New York, N. Y.
Wortendyke Mfg. Co., Richmond, Va.
Yorkville Paper Co., Inc., New York, N. Y.

BAGS, KRAFT-LINED

Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C., Co., Devon, Pa.
Chase Bag Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Continental Bag Specialties Corp., New York, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Disbrow Mfg. Co., Inc., Newark, N. J.
Eureka Mfg. Co., Inc., Taunton, Mass.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Mehl Mfg. Co., Cincinnati, Ohio
Newark Glassine Bag Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Premier Bag Co., Inc., Lyndhurst, N. Y.
Royal, Thomas M., & Co., Phila., Pa.
Schorsch & Co., Inc., New York, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Union Bag & Paper Corp., New York, N. Y.
Yorkville Paper Co., Inc., New York, N. Y.

BAGS, MULTIWALL HEAVY DUTY

American-National Bag & Burlap Co., Inc., Bklyn, N. Y.
Arkell & Smiths, Canajoharie, N. Y.
Bagpak, Inc., New York, N. Y.
Bemis Bro. Bag., St. Louis, Mo.
Betner, Benj. C., Co., Devon, Pa.
Central States Paper & Bag Co., St. Louis, Mo.
Chase Bag Co., Chicago, Ill.
Cromwell Paper Co., The, Chicago, Ill.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
George & Sherrard Paper Co., New York, N. Y.
Hollingsworth & Whitney Co., Boston, Mass.
International Paper Prods., Div. of International Paper Co., New York, N. Y.
Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind.
Kraft Bag Corp., New York, N. Y.
Premier Bag Co., Inc., Lyndhurst, N. J.
Raymond Bag Co., The, Middletown, Ohio
Reynolds Metals Co., Richmond, Va.
St. Regis Paper Co., New York, N. Y.
Schorsch & Co., Inc., New York, N. Y.
Union Bag & Paper Corp., New York, N. Y.
Wortendyke Mfg. Co., The, Richmond, Va.
Yorkville Paper Co., Inc., New York, N. Y.

BAGS, OPEN MESH

Bemis Bro. Bag Co., St. Louis, Mo.
Brown & Brown, Mobile, Ala.
Chase Bag Co., Chicago, Ill.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Hardin Bag & Burlap Co., Inc., The, New Orleans, La.
Mente & Co., Inc., New Orleans, La.
Noon Bag Co., Portland, Ore.
Premier Bag Co., Inc., Lyndhurst, N. J.
Ullmann Bag Co., Detroit, Mich.

BAGS, TEXTILE

Acme Burlap Bag Co., Bklyn, N. Y.
American National Bag & Burlap Co., Inc., Bklyn, N. Y.
Ames Bag Co., Cleveland, Ohio
Ames Harris Neville Co., San Francisco, Calif.
Arkell Safety Bag Co., New York, N. Y.
Augusta Bag & Burlap Co., Augusta, Ga.
Bader Bros. Bag Co., Detroit, Mich.
Bannon Bag Co., The, New Orleans, La.
Bemis Bro. Bag Co., St. Louis, Mo.
Boldt Bag Co., The, Houston, Texas
Bosworth, M. M., Co., Memphis, Tenn.
Brown & Brown, Mobile, Ala.
Burka Bag Co. of Texas, Galveston, Texas
Central Bag & Burlap Co., Chicago, Ill.
Chase, H. & L., Boston, Mass.
Chase Bag Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati, (Lockland), Ohio
Continental Bag Specialties Corp., New York, N. Y.
Cottonluxe Mfg. Co., New York, N. Y.
Crescent Burlap Bag Co., New Orleans, La.
Crystal Bag Co., Chickamauga, Ga.
Erwin Bag Co., Houston, Texas
Eureka Mfg. Co., Inc., Taunton, Mass.
Friedman Bag Co., Los Angeles, Calif.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Gallie-King Bag Co., Houston, Texas
General Bag Corp., Cleveland, Ohio
Grafflin Bag Co., Inc., Baltimore, Md.
Grimes Co., The, Denver, Colo.
Halsted, E. S., & Co., Inc., New York, N. Y.
Hardin Bag & Burlap Co., Inc., The, New Orleans, La.
Hutchinson Bag Co., Hutchinson, Kan.
Kent, Percy, Bag Co., New York, N. Y.
Keystone Bag & Burlap Co., Lancaster, Pa.
King Bag Co., Cincinnati, Ohio
King Mfg. Co., Cincinnati, Ohio
Lawson, Jacob, Bag Co., New York, N. Y.
Lone Star Bag & Bagging Co., Houston, Texas
Maine Potato Bag Co., Caribou, Me.
Mente & Co., Inc., New Orleans, La.
Midland Bag, Inc., Cleveland, Ohio
Millhiser Bag Co., Richmond, Va.
Milprint, Inc., Milwaukee, Wis.
Missouri Bag Co., St. Louis, Mo.
Morgan Bros., Richmond, Va.
National Bag Corp., New York, N. Y.
Neahr, M. J., & Co., Chicago, Ill.
Noon Bag Co., Portland, Ore.
Northeastern Bag & Burlap Co., New York, N. Y.
Oneida Paper Products, Inc., New York, N. Y.
Pacific Diamond H Bag Co., San Francisco, Calif.
Premier Bag Co., Inc., Lyndhurst, N. J.
Producers Dealers Supply Co., Boston, Mass.
Progressive Bag Co., Inc., New Haven, Conn.
Sacramento Bag Mfg. Co., Sacramento, Calif.
Southern California Bag Co., Los Angeles, Calif.
Southern States Bag Co., Jacksonville, Fla.
Sprosty, Dan A., Bag Co., Baltimore, Md.
Sterling Bag Co., Bklyn, N. Y.
Tobias, Max N., Bag Co., New Orleans, La.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Ullmann Bag Co., Detroit, Mich.
Varey-Shea Bag Corp., Elizabeth, N. J.
Virginia Carolina Chemical Co., Richmond, Va.
Walker Bag Co., Louisville, Ky.
Werthan Bag Corp., Nashville, Tenn.
Wertheimer Bag Co., Wilmington, N. C.
West Coast Bags, Inc., Los Angeles, Calif.
Woodward Bag Co., Augusta, Ga.

BAGS, TRANSPARENT

(Cellulosic)

American Paper Goods Co., The, Kensington, Conn.
Arvey Corp., Jersey City, N. J.
Central States Paper & Bag Co., St. Louis, Mo.
Comet Envelope & Paper Co., Inc., New York, N. Y.
Continental Bag Specialties Corp., New York, N. Y.
Crystal Transparent Corp., New York, N. Y.
Crystal Tube Mfg. Corp., Chicago, Ill.
Cupples-Hesse Corp., St. Louis, Mo.
Dennison Mfg. Co., Framingham, Mass.
Dobeckmun Co., The, Cleveland, Ohio
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Herz, Alexander, Co., Inc., New York, N. Y.

Humitube Mfg. Co., Peoria, Ill.
Interstate Folding Box Co., Middletown, Ohio
Ivers-Lee Co., Newark, N. J.
Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind.
Mason Envelope Co., New York, N. Y.
Mehl Mfg. Co., Cincinnati, Ohio
Milprint, Inc., Milwaukee, Wis.
Modern Containers, Inc., Los Angeles, Calif.
Moist-R-Proof Co., San Francisco, Calif.
Moser Bag & Paper Co., Cleveland, Ohio
Munson Bag Co., The, Cleveland, Ohio
National Transparent Plastics Co., Springfield, Mass.
Neostyle, Inc., Chicago, Ill.
Newark Glassine Bag Co., Newark, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Pollock Paper & Box Co., Dallas, Texas
Print-A-Tube Co., Passaic, N. J.
Royal, Thomas M., & Co., Phila., Pa.
Shellmar Products Co., Mt. Vernon, Ohio
Silcocks-Miller Co., The, South Orange, N.J.
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Texas Paper Box Mfg. Co., Dallas, Texas
Tower Envelope Co., New York, N. Y.
Trans-Pac Services, Inc., New York, N. Y.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.
Visking Corp., The, Chicago, Ill.
Wolf Bros., Phila., Pa.
Yorkville Paper Co., Inc., New York, N. Y.

BAGS, WATERPROOF

Angier Corp., Framingham, Mass.
Arvey Corp., Jersey City, N. J.
Bemis Bro. Bag Co., St. Louis, Mo.
Central States Paper & Bag Co., St. Louis, Mo.
Chase Bag Co., Chicago, Ill.
Cincinnati Industries, Inc., Cincinnati (Lockland), Ohio
Continental Bag Specialties Corp., New York, N. Y.
Cromwell Paper Co., The, Chicago, Ill.
Cupples-Hesse Corp., St. Louis, Mo.
Disbrow Mfg. Co., Newark, N. J.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Interstate Folding Box Co., Middletown, Ohio
Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind.
Mason Envelope Co., New York, N. Y.
Mehl Mfg. Co., Cincinnati, Ohio
Millprint Inc., Milwaukee, Wis.
Moist-R-Proof Container Co., San Francisco, Calif.
Munson Bag Co., The, Cleveland, Ohio
National Water-Proofing Co., Camden, N. J.
Neostyle, Inc., Chicago, Ill.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Print-A-Tube Co., Passaic, N. J.
Raymond Bag Co., The, Middletown, Ohio
Reynolds Metals Co., Richmond, Va.
Royal, Thomas M., & Co., Phila., Pa.
Schorsch & Co., Inc., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Sisalkraft Co., The, Chicago, Ill.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.
U. S. Envelope Co., Springfield, Mass.
Visking Corp., The, Chicago, Ill.
Yorkville Paper Co., Inc., New York, N. Y.

BAGS, WINDOW

Continental Bag Specialties Corp., New York, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Milprint, Inc., Milwaukee, Wis.
Neostyle, Inc., Chicago, Ill.
Newark Glassine Bag Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Paramount Paper Products Co., Phila., Pa.
Royal, Thomas M., & Co., Phila., Pa.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
Union Bag & Paper Corp., New York, N. Y.

BOTTLES, ALUMINUM

American Aluminum Ware Co., Newark, N. J.
Seal-Spout Corp., Newark, N. J.

BOTTLES, APPLIED COLOR

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W., Co., Chicago, Ill.
Buck Glass Co., The, Baltimore, Md.
Carr-Lowrey Glass Co., Baltimore, Md.
Coloroid Co., Inc., Cleveland, Ohio
Glass Containers, Inc., Los Angeles, Calif.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass, Co., Vineland, N. J.
Liberty Glass Co., Sapulpa, Okla.
Owens-Illinois Glass Co., Toledo, Ohio
Swindell Bros., Baltimore, Md.
Wheaton, T. C., Co., Millville, N. J.

BOTTLES, BEVERAGE

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W., Co., Chicago, Ill.
Brockway Glass Co., Inc., Brockway, Pa.
Buck Glass Co., The, Baltimore, Md.
Glass Containers, Inc., Los Angeles, Calif.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Liberty Glass Co., Sapulpa, Okla.
Olean Glass Co., Olean, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Swindell Bros., Baltimore, Md.
Thatcher Mfg. Co., Elmira, N. Y.

BOTTLES, FOOD PACKING

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W., Co., Chicago, Ill.
Brockway Glass Co., Inc., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Containers, Inc., Los Angeles, Calif.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Olean Glass Co., Olean, N. Y.
Owens-Illinois Glass Co., Toledo, Ohio
Thatcher Mfg. Co., Elmira, N. Y.

BOTTLES, HAND MADE

Braun, W., Co., Chicago, Ill.
Carr-Lowrey Glass Co., Baltimore, Md.
Corning Glass Works, Corning, N. Y.
Glass Industries, Inc., New York, N. Y.
Kimble Glass Co., Vineland, N. J.
Swindell Bros., Baltimore, Md.
Wheaton, T. C., Co., Millville, N. J.

BOTTLES, MILK

Buck Glass Co., The, Baltimore, Md.
Liberty Glass Co., Sapulpa, Okla.
Owens-Illinois Glass Co., Toledo, Ohio
Thatcher Mfg. Co., Elmira, N. Y.

BOTTLES, MINIATURE

Brockway Glass Co., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Industries, Inc., New York, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Owens-Illinois Glass Co., Toledo, Ohio

BOTTLES, PLASTIC

Celluplastic Corp., Newark, N. J.
Columbus Plastic Products, Columbus, Ohio
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Great American Plastics Co., Leominster, Mass.
Mack Molding Co., Wayne, N. J.
Owens-Illinois Glass Co., Toledo, Ohio
Plax Corp., Hartford, Conn.
Pro-phy-lac-tic Brush Co., The, Prolon Div., Florence, Mass.

BOTTLES, PROPRIETARY & PRESCRIPTION

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W., Co., Chicago, Ill.
Brockway Glass Co., Inc., Brockway, Pa.
Buck Glass Co., The, Baltimore, Md.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Containers, Inc., Los Angeles, Calif.
Glass Industries, Inc., New York, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Maryland Glass Corp., Baltimore, Md.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Swindell Bros., Baltimore, Md.
Thatcher Mfg. Co., Elmira, N. Y.
Wheaton, T. C., Co., Millville, N. J.

BOTTLES, SERUM

Brockway Glass Co., Inc., Brockway, Pa.
Corning Glass Works, Corning, N. Y.
Glass Industries, Inc., New York, N. Y.
Kimble Glass Co., Vineland, N. J.
Owens-Illinois Glass Co., Toledo, Ohio

BOTTLES, TOILET, PERFUME, COSMETIC

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W., Co., Chicago, Ill.
Brockway Glass Co., Inc., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Containers, Inc., Los Angeles, Calif.
Glass Industries, Inc., New York, N. Y.
Hamilton, J. T. & A., Co., Pittsburgh, Pa.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Maryland Glass Corp., Baltimore, Md.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Sager Bros., New York, N. Y.
Swindell Bros., Baltimore, Md.
Wheaton, T. C., Co., Millville, N. J.

Addresses of companies listed appear on pages 945–955

BOXES, CORRUGATED & SOLID FIBRE

Ajax Box Co., Chicago, Ill.
American Box Board Co., Grand Rapids, Mich.
American Coating Mills, Inc., Elkhart, Ind.
Anderson Box & Basket Co., New York, N. Y.
Andrews, O. B., Co., Chattanooga, Tenn.
Arvey Corp., Jersey City, N. J.
Ashtabula Corrugated Box Co., The, Ashtabula, Ohio
Atlanta Paper Co., Atlanta, Ga.
Atlas-Boxmakers, Inc., Chicago, Ill.
Bird & Son, Inc., East Walpole, Mass.
Birmingham Paper Co., Birmingham, Ala.
Carpenter Container Corp., Bklyn, N. Y.
Columbia Paper Box Co., Washington, D. C.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago, Ill.
Continental Can Co., Inc., New York, N. Y.
Continental Container Corp., Bklyn, N. Y.
Crook Paper Box Co., Kansas City, Mo.
Eddy Paper Corp., The, Chicago, Ill.
Eggerss O'Flying Co., Omaha, Nebr.
Excelsior Paper Specialties Co., New York, N. Y.
Federal Container Co., Phila., Pa.
Fibreboard Products, Inc., San Francisco, Calif.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Gair, Robert Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Grand City Container Corp., New York, N. Y.
Hankins Container Co., Cleveland, Ohio
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Inland Container Corp., Indianapolis, Ind.
Keystone Box Co., Pittsburgh, Pa.
Kress, F. J., Box Co., Pittsburgh, Pa.
Maryland Container Co., Baltimore, Md.
National Container Corp., Long Island City, N. Y.
National Metal Edge Box Co., Phila., Pa.
National Paper Box Co., Kansas City, Mo.
Nelson, B. F., Mfg. Co., Minneapolis, Minn.
New England Box Co., Greenfield, Mass.
Ohio Boxboard Co., The, Rittman, Ohio
Old Dominion Box Co., Lynchburg, Va.
Ottawa River Paper Co., The, Toledo, Ohio
Owens-Illinois Glass Co., Toledo, Ohio
Owens-Illinois Pacific Coast Co., San Francisco, Calif.
Pollock Paper & Box Co., Dallas, Texas
Rosner Container Co., New York, N. Y.
St. Regis Paper Co., New York, N. Y.
Schulz, A. Geo., Co., Milwaukee, Wis.
Spear Box Co., Inc., New York, N. Y.
Texas Paper Box Mfg. Co., Dallas, Texas
Transcontinental Container Corp., Corona, L. I., N. Y.
U. S. Corrugated Fibre Box Co., Indianapolis, Ind.
Waldorf Paper Products Co., St. Paul, Minn.

BOXES, CORRUGATED & SOLID FIBRE WITH WOODEN FRAMES

Anderson Box & Basket Co., New York, N. Y.
Andrews, O. B., Co., Chattanooga, Tenn.
Ashtabula Corrugated Box Co., The, Ashtabula, Ohio
Cambridge Paper Box Co., Cambridge, Mass.
Copeland Displays, Inc., New York, N. Y.
Eddy Paper Corp., The, Chicago, Ill.
Ohio Boxboard Co., The, Rittman, Ohio
Owens-Illinois Glass Co., Toledo, Ohio
Ross Paper Box Co., New York, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.

BOXES, FANCY WOOD

Anderson Box & Basket Co., New York, N. Y.
Andrews, O. B., Co., Chattanooga, Tenn.
Arrow Mfg. Co., Inc., Hoboken, N. J.
Autokraft Box Corp., Hanover, Pa.
Birmingham Paper Co., Birmingham, Ala.
Copeland Displays, Inc., New York, N. Y.
Electric City Box Co., Buffalo, N. Y.
Eureka Mfg. Co., Inc., Taunton, Mass.
Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Mele Mfg. Co., New York, N. Y.
New England Box Co., Greenfield, Mass.
Nicoll & Co., San Francisco, Calif.
Nussbaum Novelty Co., Berne, Ind.
Parfait Powder Puff Co., Inc., Chicago, Ill.
Peterson Bros., Chicago, Ill.
Pilliod Cabinet Co., The, Swanton, Ohio
Seaman Box Co., Inc., New York, N. Y.
Smith, S. K., Co., Chicago, Ill.
Stiles, H. A., & Co., Boston, Mass.
Trilsch, Oscar, Co., Whitestone, N. Y.
Warner Bros. Co., The, Bridgeport, Conn.

BOXES, LEATHERETTE

Acme Paper Box Co., Chicago, Ill.
Apex Paper Box Corp., Chicago, Ill.
Arrow Mfg. Co., Inc., Hoboken, N. J.
Atlantic Paper Box Co., Boston, Mass.
Beggs & Graham, Phila., Pa.
Cambridge Paper Box Co., Cambridge, Mass.
Chaspec Mfg. Co., New York, N. Y.
Consolidated Box Co., Inc., Tampa, Fla.
Deisroth, W. H., Co., Inc., Phila., Pa.
Dennison Mfg. Co., Framingham, Mass.
Ehlbert Products, Chicago, Ill.
Electric City Box Co., Buffalo, N. Y.
Eureka Mfg. Co., Inc., Taunton, Mass.
Farrington Mfg. Co., Boston, Mass.
Fleisig, H., Inc., New York, N. Y.
Globe Paper Box Co., Chicago, Ill.
Globe Paper Box Mfg. Co., St. Paul, Minn.
Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Howell, F. M., & Co., Elmira, N. Y.
Jones, Jesse, Paper Box Co., Phila., Pa.
Livingston & Co., Inc., New York, N. Y.
Leominster Paper Box Co., Leominster, Mass.
Lindley Box & Paper Co., Marion, Ind.
Lorscheider-Schang Co., Inc., The, Rochester, N. Y.
Mason Box Co., The Attleboro Falls, Mass.
National Metal Edge Box Co., Phila., Pa.
National Paper Box Co., Kansas City, Mo.
Neumann, Robert Co., The, Cincinnati, Ohio
Old Dominion Box Co., Lynchburg, Va.
Pictorial Paper Package Corp., Aurora, Ill.
Pilliod Cabinet Co., The, Swanton, Ohio
Schmidt, Henry, & Bro., Inc., Phila., Pa.
Schulz, A. Geo., Co., Milwaukee, Wis.
Seaman Box Co., Inc., New York, N. Y.
Smith, S. K., Co., Chicago, Ill.
Star Case Co., The, New York, N. Y.
Trilsch, Oscar, Co., Whitestone, N. Y.
Universal Jewelry Case Co., Chicopee, Mass.
Warner Bros. Co., The, Bridgeport, Conn.
Weinman Bros., Chicago, Ill.

BOXES, MAILING

Acme Folding Box Co., Inc., New York, N. Y.
Acme Paper Box Co., Chicago, Ill.
American Package Co., New York, N. Y.
Barger Box Co., Inc., Elkhart, Ind.
Beggs & Graham, Phila., Pa.
Brooks & Porter, Inc., New York, N. Y.
Burnett, R. C., Co., San Antonio, Texas
Calumet Carton Co., Harvey, Ill.
Cambridge Paper Box Co., Cambridge, Mass.
Campbell Box & Tag Co., South Bend, Ind.
Casco Paper Box Co., Inc., Portland, Me.
Central Carton Co., The, Cincinnati, Ohio
Cin-Made Corp., The, Cincinnati, Ohio
Clover Box & Mfg. Co., Inc., New York, N. Y.
Columbia Paper Box Co., Washington, D. C.
Crook Paper Box Co., Kansas City, Mo.
Cross Paper Products Corp., New York, N. Y.
Cowles, Harold A., Box & Display Co., Rochester, N. Y.
Deisroth, W. H., Co., Inc., Phila., Pa.
Delman Paper Box Co., The, Cincinnati, Ohio
Disbrow Mfg. Co., Inc., Newark, N. J.
Electric City Box Co., Buffalo, N. Y.
Estes, E. B., & Sons, Inc., New York, N. Y.
Fitzhugh, Wm. W., Inc., New York, N. Y.
Flashfold Box Corp., Ft. Wayne, Ind.
Fleishhacker Paper Box Co., San Francisco, Calif.
Fleisig, H., Inc., New York, N. Y.
Fox, C. J., Co., The, Providence, R. I.
Frankenberg Bros., Inc., Columbus, Ohio
Friend Box Co., Danvers, Mass.
Gair, Robert, Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Gates Paper Co., Ltd., The, Los Angeles, Calif.
Gereke-Allen Carton Co., St. Louis, Mo.
Globe Paper Box Co., Chicago, Ill.
Henry, Ira L., Co., Watertown, Wis.
Hinde & Dauch Paper Co., Sandusky, Ohio
Hope Paper Box Co., Providence, R. I.
Howell, F. M., & Co., Elmira, N. Y.
Indianapolis Paper Container Co., Indianapolis, Ind.
International Mailing Tube & Wrapper Co., Long Island City, N. Y.
Kalamazoo Paper Box Co., Kalamazoo, Mich.
Keystone Box Co., Pittsburgh, Pa.
Kiernan-Hughes Co., Jersey City, N. J.
Koehl, Wm., Co., The, Cincinnati, Ohio
Lengsfield Bros., Inc., New Orleans, La.
Lindley Box & Paper Co., Marion, Ind.
Livingston & Co., Inc., New York, N. Y.
Mason Box Co., The, Attleboro Falls, Mass.
Michigan Carton Co., Battle Creek, Mich.
Miller, Walter P., Co., Inc., Phila., Pa.
Mooney & Mooney, Inc., Newark, N. J.
Myers, J. & P. B., Inc., Jersey City, N. J.
National Folding Box Co., New Haven, Conn.
National Metal Edge Box Co., Phila., Pa.
National Paper Box Co., Kansas City, Mo.
Nelson, B. F., Mfg. Co., Minneapolis, Minn.
Neumann, Robert, Co., The, Cincinnati, Ohio
Ohio Boxboard Co., The, Rittman, Ohio
Old Dominion Box Co., Lynchburg, Va.
Paper Package Co., Indianapolis, Ind.
Pharmacy Paper Box Co., Chicago, Ill.
Pictorial Paper Package Corp., Aurora, Ill.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Texas
Ritchie, W. C., & Co., Chicago, Ill.
Rudnic, A. & A., Inc., New York, N. Y.
Schmidt, Henry, & Bro., Inc., Phila., Pa.
Schoettle, Edwin J., Co., Phila., Pa.
Schulz, A. Geo., Co., Milwaukee, Wis.
Seaman Box Co., Inc., New York, N. Y.
Sears, Merle, Paper Box Co., Danville, Ill.
Shampain, Citron, Clark, Inc., Bklyn, N. Y.
Shaw-Randall Co., Pawtucket, R. I.
Shoup-Owens, Inc., Hoboken, N. J.
Shuttleworth Carton Co., Inc., New York, N. Y.
Simplex Paper Box Corp., Lancaster, Pa.
Stein, A., & Co., Chicago, Ill.
Spear Box Co., Inc., New York, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Taylor Box Co., Providence, R. I.
Thoma Paper Box Co., Inc., Buffalo, N. Y.
Universal Jewelry Case Co., Chicopee, Mass.
Waldorf Paper Products Co., St. Paul, Minn.

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Wilkata Folding Box Co., The, Kearney, N. J.
Wilkins Paper Box Co., Inc., Boston, Mass.
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Wolverine Carton Co., Grand Rapids, Mich.
Young, Douglas, Inc., Pawtucket, R. I.
Young, Everett, Co., Providence, R. I.

BOXES, METAL, COVERED

(Fabric, Leatherette, Etc.)

Arrow Mfg. Co., Inc., Hoboken, N. J.
Electric City Box Co., Buffalo, N. Y.
Eureka Mfg. Co., Inc., Taunton, Mass.
Farrington Mfg. Co., Boston, Mass.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Hudson, H. L., Co., The, Bklyn, N. Y.
National Paper Box Co., Kansas City, Mo.
Reynolds Metals Co., Richmond, Va.
Seaman Box Co., Inc., New York, N. Y.
Smith, S. K., Co., Chicago, Ill.

BOXES, METAL EDGE

Fleishhacker Paper Box Co., San Francisco, Calif.
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
National Metal Edge Box Co., Phila., Pa.
Seaman Box Co., Inc., New York, N. Y.
Warner Bros. Co., The, Bridgeport, Conn.

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(For Mascara, Cosmetics, Compacts, Etc.)

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Aluminum Co. of America, Pittsburgh, Pa.
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American Aluminum Ware Co., Newark, N. J.
Beggs & Graham, Phila., Pa.
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Crown Can Co., Phila., Pa.
Ellis, George D., & Sons, Inc., Phila., Pa.
Farrington Mfg. Co., Boston, Mass.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Gutmann, Ferdinand, & Co., Bklyn, N. Y.
Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Hudson, H. L., Co., The, Bklyn, N. Y.
Majestic Metal Specialties, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Products Co., The, Seymour, Conn.
Smith, S. K., Co., Chicago, Ill.

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Alderman Paper Box Corp., Rochester, N. Y.
American Package Co., New York, N. Y.
American Tri-State Paper Box Co., Nashville, Tenn.
Angelus Paper Box Corp., Los Angeles, Calif.
Apex Paper Box Corp., Chicago, Ill.
Arvey Corp., Jersey City, N. J.
Atlanta Box Factory, Inc., Atlanta, Ga.
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Atlantic Paper Box Co., Boston, Mass.
Atlantic Paper Box Corp., The, Jersey City, N. J.
Atlas-Boxmakers, Inc., Chicago, Ill.
Atlas Paper Box Co., Chattanooga, Tenn.
Babcock, A. H., Co., The, Attleboro, Mass.
Baldwin, Eli, & Son, Inc., New York, N. Y.
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Claff, M. B., & Sons, Inc., Randolph, Mass.
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Crook Paper Box Co., N. Kansas City, Mo.
Danbury Square Box Co., The, Danbury, Conn.
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North State Paper Box Co., Statesville, N. C.
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Shaw-Randall Co., Pawtucket, R. I.
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Smith-Lustig Paper Box Mfg. Co., The, Cleveland, Ohio
Snyder, Geo. H., Inc., Phila., Pa.
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Stein, A., & Co., Chicago, Ill.
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Strouse, Adler Co., The, New Haven, Conn.
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Texas Paper Box Mfg. Co., Dallas, Texas
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Trilsch, Oscar, Co., Whitestone, N. Y.
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Young, Douglas, Inc., Pawtucket, R. I.
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Zumbiel, C. W., Co., The, Norwood, Ohio

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Burdick & Son, Albany, N. Y.
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Clark, J. L., Mfg. Co., Rockford, Ill.
Columbia Specialty Co., Inc., Baltimore, Md.
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Crown Can Co., Phila., Pa.
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Grammes, L. F., & Sons, Inc., Allentown, Pa.
Gutmann, Ferdinand, & Co., Bklyn, N. Y.
Heekin Can Co., Cincinnati, Ohio
Hudson, H. L., Co., The, New York, N. Y.
Independent Can Co., Baltimore, Md.
Liberty Can & Sign Co., Lancaster, Pa.
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Mason Can Co., E. Providence, R. I.
National Can Corp., New York, N. Y.
Pacific Can Co., San Francisco, Calif.
Purepac Corp., New York, N. Y.
Robertson Can Co., Springfield, Ohio
Seymour Products Co., The, Seymour, Conn.
Stuber & Kuck Co., Peoria, Ill.
Western Can Co., San Francisco, Calif.

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Globe Paper Box Co., Chicago, Ill.
Leominster Paper Box Co., Leominster, Mass.
Makdon Co., New York, N. Y.
Smith, S. K., Co., Chicago, Ill.
Universal Jewelry Case Co., Chicopee, Mass.

BOXES & BASKETS, FRUIT & VEGETABLE

Andrews, O. B., Co., Chattanooga, Tenn.
Ashtabula Corrugated Box Co., The, Ashtabula, Ohio
Container Corp. of America, Chicago, Ill.
Fibreboard Products, Inc., San Francisco, Calif.
Gair, Robert, Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Inland Container Corp., Indianapolis, Ind.
Inman Mfg. Co., Inc., Amsterdam, N. Y.
Kress, F. J., Box Co., Pittsburgh, Pa.
National Metal Edge Box Co., Phila., Pa.
Ohio Boxboard Co., The, Rittman, Ohio
Schoettle, Edwin J., Co., Phila., Pa.
Seaman Box Co., Inc., New York, N. Y.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
U. S. Corrugated Fiber Box Co., Indianapolis, Ind.
Verhalen, Walter, Co., Hope, Ark.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.

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Ace Carton Corp., Cicero, Ill.
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Andrews, O. B., Co., Chattanooga, Tenn.
Central States Paper & Bag Co., St. Louis, Mo.
Chicago Carton Co., Chicago, Ill.
Consolidated Paper Co., Monroe, Mich.
Crook Paper Box Co., Kansas City, Mo.
Crown Can Co., Phila., Pa.
Densen-Banner Co., Ridgefield Park, N. J.
Empire Box Corp., Garfield, N. J.
Gair, Robert, Co., Inc., New York, N. Y.
Gardner-Richardson Co., Middletown, Ohio
Gaylord Container Corp., St. Louis, Mo.
Hinde & Dauch Paper Co., Sandusky, Ohio
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Inland Container Corp., Indianapolis, Ind.
Interstate Folding Box Co., Middletown, Ohio
Lengsfield Bros., Inc., New Orleans, La.
Mason Can Co., E. Providence, R. I.
Morris Paper Mills, Chicago, Ill.
National Can Corp., New York, N. Y.
Old Dominion Box Co., Lynchburg, Va.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Texas
Schoettle, Edwin J., Co., Phila., Pa.
Schulz, A. Geo., Co., Milwaukee, Wis.
Sutherland Paper Co., Kalamazoo, Mich.
Texas Paper Box Mfg. Co., Dallas, Texas
Transparent Specialties Corp., Cleveland, Ohio
Traver Corp., Chicago, Ill.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Wolverine Carton Co., Grand Rapids, Mich.

CANS, FIBRE

American Can Co., New York, N. Y.
Beacon Container Co., New York, N. Y.
Burt, F. N., Co., Inc., Buffalo, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
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Central Paper Box Co., Kansas City, Mo.
Cin-Made Corp., The, Cincinnati, Ohio
Clark, Geo. V., Co., Inc., Long Island City, N. Y.
Cleveland Container Co., The, Cleveland, Ohio
Consolidated Box Co., Inc., Tampa, Fla.
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Cross Paper Products Corp., New York, N. Y.
Eggerss-O'Flying Co., Omaha, Nebr.
Fibro Container Corp., Minneapolis, Minn.
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Niemand Bros., Inc., Long Island City, N. Y.
Pictorial Paper Package Corp., Aurora, Ill.
Platt Corp., Baltimore, Md.
Purepac Corp., New York, N. Y.
Randolph Paper Box Co., Richmond, Va.
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Ritchie, W. C., & Co., Chicago, Ill.
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Sefton Fibre Can Co., St. Louis, Mo.
Shoup-Owens, Inc., Hoboken, N. J.
Sonoco Products Co., Hartsville, S. C.
Sutherland Paper Co., Kalamazoo, Mich.
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Young, Everett, Co., Providence, R. I.

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Fibro Container Corp., Minneapolis, Minn.
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Heminway Corp., Waterbury, Conn.
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Sutherland Paper Co., Kalamazoo, Mich.
Young, Everett, Co., Providence, R. I.

CANS, METAL

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Bertels Metal Ware Co., Inc., Kingston, Pa.
Buckeye Stamping Co., The, Columbus, Ohio
Burdick & Son, Albany, N. Y.
Bushwick Can Co., Inc., Bklyn, N. Y.
Cadillac Can Co., Mt. Clemens, Mich.
Cans, Inc., Chicago, Ill.
Central Can Co., Chicago, Ill.
Central Can Co., Inc., Kansas City, Mo.
Chesapeake Can Co., Inc., Crisfield, Md.

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Conneaut Can Co., The, Conneaut, Ohio
Continental Can Co., Inc., New York, N. Y.
Cordiano Can Co., Inc., Bklyn, N. Y.
Crown Can Co., Phila., Pa.
Davies Can Co., The, Cleveland, Ohio
Eagle Can Co., Somerville, Mass.
Eastern Can Co., Inc., Bklyn, N. Y.
Ellis, Geo. D., & Sons, Inc., Phila., Pa.
Empire Can Corp., Bklyn, N. Y.
Federal Tin Co., Inc., Baltimore, Md.
Fein's Tin Can Co., Inc., Bklyn, N. Y.
General Can Co., Chicago, Ill.
Grand Sheet Metal Works, Chicago, Ill.
Grimely, Frank J., San Francisco, Calif.
Heekin Can Co., Cincinnati, Ohio
Hudson, H. L., Co., Bklyn, N. Y.
Independent Can Co., Baltimore, Md.
LeComte & Co., Inc., Bklyn, N. Y.
Liberty Can & Sign Co., Lancaster, Pa.
Lincoln Can Mfg. Corp., Bklyn, N. Y.
Litho Can Corp., Camden, N. J.
Manufacturers Can Co., Chicago, Ill.
Mason Can Co., E. Providence, R. I.
Melvina Can Co., Maspeth, L. I., N. Y.
Milton, Geo. A., Can Co., Inc., Bklyn, N. Y.
National Can Corp., New York, N. Y.
National Tin Can Mfg. Co., New York, N. Y.
New Can Co., Inc., The, Malden, Mass.
Olive Can Co., Chicago, Ill.
Pacific Can Co., San Francisco, Calif.
Phelps Can Co., Baltimore, Md.
Philadelphia Can Co., Phila., Pa.
Platt Corp., Baltimore, Md.
Purepac Corp., New York, N. Y.
Robertson Can Co., Springfield, Ohio
Sexton Can Co., Inc., Everett, Mass.
Standard Can Co., Chicago, Ill.
Steel & Tin Prods. Co., Inc., Baltimore, Md.
Stuber & Kuck Co., Peoria, Ill.
Superior Can Co., Inc., Bklyn, N. Y.
Thompson Can Co., Dallas, Texas
Victor Metal Products Corp., Bklyn, N. Y.
Vulcan Stamping & Mfg. Co., Inc., Bellwood, Ill.
Western Can Co., San Francisco, Calif.

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(Cellulose Window)

American Aluminum Ware Co., Newark, N. J.
Cambridge Paper Box Co., Cambridge, Mass.
Clark, Geo. V., Co., Inc., Long Island City, N. Y.
Purepac Corp., New York, N. Y.
Robertson Can Co., Springfield, Ohio
Seaman Box Co., Inc., New York, N. Y.
Spear Box Co., New York, N. Y.
Vulcan Stamping & Mfg. Co., Bellwood, Ill.

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National Folding Box Co., New Haven, Conn.
Sealright Co., Inc., The, Fulton, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.

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Cambridge Paper Box Co., Cambridge, Mass.
Celanese Celluloid Corp., New York, N. Y.
Celluplastic Corp., Newark, N. J.
Central States Paper & Bag Co., St. Louis, Mo.
Cin-Made Corp., The, Cincinnati, Ohio
Clark, Geo. V., Co., Inc., Long Island City, N. Y.
Cleveland Container Co., The, Cleveland, Ohio
Clover Box & Mfg. Co., Inc., New York, N. Y.
Fleishhacker Paper Box Co., San Francisco, Calif.
Great American Plastics Co., Leominster, Mass.
Henry, Ira L., Co., Watertown, Wis.
Levy, Maurice, New York, N. Y.
Miller, Walter P., Co., Inc., Phila., Pa.
National Transparent Plastics Co., Springfield, Mass.
Neostyle, Inc., Chicago, Ill.
Old Dominion Box Co., Lynchburg, Va.
Ritchie, W. C., & Co., Chicago, Ill.
Seaman Box Co., Inc., New York, N. Y.
Shaw Paper Box Co., Pawtucket, R. I.
Shaw-Randall Co., Pawtucket, R. I.
Sillcocks-Miller Co., The, S. Orange, N. J.
Transparent Specialties Corp., Cleveland, Ohio
Weinman Bros., Chicago, Ill.

CARTONS, CAN & BOTTLE CARRIERS

Albert Paper Box Co., Inc., Bklyn, N. Y.
American Coating Mills, Inc., Elkhart, Ind.
Andrews, O. B., Co., Chattanooga, Tenn.
Ashtabula Corrugated Box Co., The, Ashtabula, Ohio
Atlanta Paper Box Co., Atlanta, Ga.
Atlantic Carton Corp., Norwich, Conn.
Badger Carton Co., Milwaukee, Wis.
Berles Carton Co., Inc., Paterson, N. J.
Blum Folding Paper Box Co., Inc., Bklyn, N. Y.
Brown & Bailey Co., Phila., Pa.
Burt, F. N., Co., Inc., Buffalo, N. Y.
Chicago Carton Co., Chicago, Ill.
Container Corp. of America, Chicago, Ill.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Continental Paper Products Co., Denver, Colo.
Empire Box Corp., Garfield, N. J.
Federal Carton Corp., New York, N. Y.
Fitzhugh, Wm. W., Inc., New York, N. Y.
Forbes Lithograph Mfg. Co., Boston, Mass.
Fort Orange Paper Co., Castleton-on-Hudson, N. Y.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Gair, Robert, Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Gaylord Container Corp., St. Louis, Mo.
Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Grand Rapids Paper Box Co., Grand Rapids, Mich.
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
International Folding Paper Box Co., Inc., N. Bergen, N. J.
Interstate Folding Box Co., The, Middletown, Ohio
Koehl, Wm., Co., The, Cincinnati, Ohio
Lengsfield Bros., Inc., New Orleans, La.
Lowman Folding Box Corp., Syracuse, N. Y.
Marathon Corp., Menasha, Wis.
Milprint, Inc., Milwaukee, Wis.
Modern Packages Co., Memphis, Tenn.
Morris Paper Mills, Chicago, Ill.
National Metal Edge Box Co., Phila., Pa.
Nelson, B. F., Mfg. Co., The, Minneapolis, Minn.
Ohio Boxboard Co., The, Rittman, Ohio
Old Dominion Box Co., Lynchburg, Va.
Owens-Illinois Glass Co., Toledo, Ohio
Paper Package Co., Indianapolis, Ind.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Texas
Reynolds Metals Co., Richmond, Va.
Richardson-Taylor-Globe Corp., Cincinnati, Ohio
Robertson Paper Box Co., Inc., Montville, Conn.
Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Sample-Durick Co., Inc., Indian Orchard, Mass.
Schmidt Lithograph Co., San Francisco, Calif.
Schoettle, Edwin, J., Co., Phila., Pa.
Standard Paper Box Co., Detroit, Mich.
Sutherland Paper Co., Kalamazoo, Mich.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Wilkata Folding Box Co., The, Kearny, N. J.
Wolverine Carton Co., Grand Rapids, Mich.

CARTONS, FOLDING & DISPLAY

Ace Carton Corp., Chicago, Ill.
Acme Folding Box Co., St. Louis, Mo.
Acme Folding Box Co., Inc., New York, N. Y.
Acme Paper Box Co., Chicago, Ill.
Addison Lithographing Co., Rochester, N. Y.
Albert Paper Box Co., Inc., Bklyn, N. Y.
American Box Board Co., Grand Rapids, Mich.
American Coating Mills, Inc., Elkhart, Ind.
American Folding Box Co., St. Louis, Mo.
American Package Co., New York, N. Y.
American Tri-State Paper Box Co., Nashville, Tenn.
Andrews, O. B., Co., Chattanooga, Tenn.
Andrews, P. L., Corp., Bklyn, N. Y.
Angelus Paper Box Co., Los Angeles, Calif.
Arvey Corp., Jersey City, N. J.
Atlanta Paper Co., Atlanta, Ga.
Atlantic Carton Corp., Norwich, Conn.
Atlas-Boxmakers, Inc., Chicago, Ill.
Automatic Paper Box Corp., Chicago, Ill.
Badger Carton Co., Milwaukee, Wis.
Barger Box Co., Inc., Elkhart, Ind.
Berles Carton Co., Inc., Paterson, N. J.
Bicknell & Fuller Paper Box Co., Boston, Mass.
Birmingham Paper Co., Birmingham, Ala.
Bloomer Bros. Co., Newark, New York State
Blum Folding Paper Box Co., Inc., Bklyn, N. Y.
Bridgeport Paper Box Co., Bridgeport, Conn.
Brooks & Porter, Inc., New York, N. Y.
Brooks Bank Note Co., Springfield, Mass.
Brown & Bailey Co., Phila., Pa.
Burnett, R. L., Co., San Antonio, Texas
Burt, F. N., Co., Inc., Buffalo, N. Y.
Campbell Box & Tag Co., South Bend, Ind.
Carton Service, Inc., Shelby, Ohio
Central Carton Co., Cincinnati, Ohio
Central Paper Box Co., Kansas City, Mo.
Chicago Carton Co., Chicago, Ill.
Chicago Label & Box Co., Chicago, Ill.
Columbia Paper Box Co., Washington, D.C.
Columbus Paper Box Co., Inc., Columbus, Ohio
Consolidated Paper Co., Monroe, Mich.
Consolidated Paper & Box Mfg. Co., Richmond, Va.
Container Corp. of America, Chicago, Ill.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Continental Paper Prods. Co., Denver, Colo.
Cowles' Box & Display Co., Harold A., Rochester, N. Y.
Crescent Box Corp., Phila., Pa.
Curtis, S., & Son, Inc., Sandy Hook, Conn.
Delman Paper Box Co., The, Chicago, Ill.
Dennison Mfg. Co., Framingham, Mass.
Densen-Banner Co., Ridgefield Park, N. J.
Diamond Paper Box Co., Rochester, N. Y.
Disbrow Mfg. Co., Inc., Newark, N. J.
Dowd, M. S., Carton Co., Hartford, Conn.
Eggerss-O'Flying Co., Omaha, Nebr.

Addresses of companies listed appear on pages 945–955

XUM

Empire Box Corp., Chicago, Ill.
Empire Box Corp., Garfield, N. J.
Eureka Paper Box Co., Williamsport, Pa.
Fairchild, E. E., Corp., Rochester, N. Y.
Federal Carton Corp., New York, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Fitzhugh, Wm. W., Inc., New York, N. Y.
Fleishhacker Paper Box Co., San Francisco, Calif.
Fleming & Sons, Inc., Dallas, Texas
Flour City Paper Box Co., Minneapolis, Minn.
Folding Boxes, Inc., Manchester, Conn.
Forbes Lithograph Mfg. Co., Boston, Mass.
Fort Orange Paper Co., Castleton-on-Hudson, N. Y.
Fox, C. J., Co., The, Providence, R. I.
Frankenberg Bros., Inc., Columbus, Ohio
Franklin Folding Paper Box Co., Chicago, Ill.
Gair, Robert, Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Gaylord Container Corp., St. Louis, Mo.
Gebhart Folding Box Co., Dayton, Ohio
Gereke-Allen Carton Co., St. Louis, Mo.
Globe Paper Box Co., Chicago, Ill.
Globe Paper Box Mfg. Co., St. Paul, Minn.
Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Grace, Tom W., Co., Dallas, Texas
Grand-City Container Corp., New York, N. Y.
Grand Rapids Paper Box Co., Grand Rapids, Mich.
Grant Paper Box Co., Pittsburgh, Pa.
Great Lakes Box Co., Cleveland, Ohio
Guilford Folding Box Co., The, Baltimore, Md.
Hashagen Paper Box Co., Washington, D. C.
High Point Paper Box Co., Inc., High Point, N. C.
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Howell, F. M., & Co., Elmira, N. Y.
Hummel & Downing Co., Milwaukee, Wis.
Ideal Carton Co., Chicago, Ill.
Imperial Box Co., Chicago, Ill.
Indianapolis Paper Container Co., Indianapolis, Ind.
Inland Lithograph Co., Chicago, Ill.
International Folding Paper Box Co., N. Bergen, N. J.
Interstate Folding Box Co., Middletown, Ohio
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Koehl, Wm., Co., The, Cincinnati, Ohio
Lebanon Paper Box Co., Lebanon, Pa.
Lengsfield Bros., Inc., New Orleans, La.
Lindley Box & Paper Co., Marion, Ind.
Lord Baltimore Press, New York, N. Y.
Lowman Folding Box Corp., Syracuse, N. Y.
Maryland Paper Box Co., Baltimore, Md.
Michigan Carton Co., Battle Creek, Mich.
Milprint, Inc., Milwaukee, Wis.
Modern Packages Co., Memphis, Tenn.
Morris Paper Mills, Chicago, Ill.
Mott Carton & Paper Co., St. Louis, Mo.
Muskegon Paper Box Co., Muskegon, Mich.
Myers, J. & P. B., Inc., Jersey City, N. J.
National Folding Box Co., New Haven, Conn.
National Metal Edge Box Co., Phila., Pa.
National Paper Box Co., Kansas City, Mo.
National Paper Box Mfg. Co., Chicago, Ill.
National Paper Co., Atlanta, Ga.
Nelson, B. F., Mfg. Co., The, Minneapolis, Minn.
Neumann, Robert, Co., Cincinnati, Ohio
Nevins-Church Press, The, New York, N.Y.
New England Collapsible Tube Co., Chicago, Ill.
New Haven Pulp & Board Co., New Haven, Conn.
Ohio Boxboard Co., The, Rittman, Ohio
Old Dominion Box Co., Lynchburg, Va.
Paper Box & Specialty Co., Sheboygan, Wis.
Paper Package Co., Indianapolis, Ind.
Pictorial Paper Package Corp., Aurora, Ill.
Pie-Pak Co., Inc., Hoboken, N. J.
Pioneer Paper Box Co., Minneapolis, Minn.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Texas
Randolph Box & Label Co., Chicago, Ill.
Randolph Paper Box Co., Richmond, Va.
Reynolds Metals Co., Richmond, Va.
Richardson-Taylor-Globe Corp., Cincinnati, Ohio
Robertson Paper Box Co., Inc., Montville, Conn.
Rochester Folding Box Co., Rochester, N.Y.
Rock City Paper Box Co., Nashville, Tenn.
Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Royal Paper Box Co., Los Angeles, Calif.
Rudnick, A. & A. Inc., New York, N. Y.
Sample-Durick Co., Inc., Chicopee, Mass.
Scandore Paper Box Co., Inc., Bklyn, N. Y.
Schmidt, Henry, & Bro., Inc., Phila., Pa.
Schmidt Lithograph Co., San Francisco, Calif.
Schoettle, Edwin J., Co., Phila., Pa.
Schulz, A. Geo., Co., Milwaukee, Wis.
Seaman Box Co., Inc., New York, N. Y.
Sears, Merle, Paper Box Co., Danville, Ill.
Self-Locking Carton Co., Chicago, Ill.
Shellmar Products Co., Mt. Vernon, Ohio
Shultz Folding Box Co., Inc., St. Louis, Mo.
Shuttleworth Carton Co., New York, N. Y.
Simplex Paper Box Corp., Lancaster, Pa.
Southern Paper Co., Ltd., New Orleans, La.
Spear Box Co., Inc., New York, N. Y.
Standard Paper Box Co., Detroit, Mich.
Standard Paper Box Corp., Los Angeles, Calif.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Superior Folding Box Co., St. Louis, Mo.
Sutherland Paper Co., Kalamazoo, Mich.
Texas Paper Box Mfg. Co., Dallas, Texas
Toledo Paper Box Co., The, Toledo, Ohio
Trenton Folding Box Co., Trenton, N. J.
Trum, E. J., Inc., Bklyn, N. Y.
Union Paper Box Co., Seattle, Wash.
United Paperboard Co., New York, N. Y.
United States Printing & Lithograph Co., The, Cincinnati, Ohio
Waldorf Paper Products Co., St. Paul, Minn.
Warneke Paper Box Co., Denver, Colo.
Warner Bros. Co., The, Bridgeport, Conn.
Western Paper Box Co., Oakland, Calif.
Whitney & Co., Leominster, Mass.
Wilkata Folding Box Co., The, Kearny, N.J.
Wilson Paper Box Co., Richmond, Va.
Wolverine Carton Co., Grand Rapids, Mich.
Zumbiel, C. W., Co., Cincinnati, Ohio

CARTONS, WAXED & PARAFFINED

American Box Board Co., Grand Rapids, Mich.
American Coating Mills, Inc., Elkhart, Ind.
American Package Co., New York, N. Y.
Andrews, O. B., Co., Chattanooga, Tenn.
Arvey Corp., Jersey City, N. J.
Atlanta Paper Co., Atlanta, Ga.
Atlantic Carton Corp., Norwich, Conn.
Berles Carton Co., Inc., Paterson, N. J.
Bloomer Bros. Co., Newark, New York State
Brooks Bank Note Co., Springfield, Mass.
Brown & Bailey Co., Phila., Pa.
Chicago Carton Co., Chicago, Ill.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago, Ill.
Continental Paper Products Co., Denver, Colo.
Densen-Banner Co., Ridgefield Park, N. J.
Diamond Paper Box Co., Inc., Rochester, N. Y.
Empire Box Corp., Garfield, N. J.
Federal Carton Corp., New York, N. Y.
Fitzhugh, Wm. W., Inc., New York, N. Y.
Fleishhacker Paper Box Co., San Francisco, Calif.
Fort Orange Paper Co., Castleton-on-Hudson, N. Y.
Fox, C. J., Co., The, Providence, R. I.
Frankenberg Bros., Inc., Columbus, Ohio
Gair, Robert, Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Gates Paper Co., Ltd., The, Los Angeles, Calif.
Gaylord Container Corp., St. Louis, Mo.
Globe Paper Box Mfg. Co., St. Paul, Minn.
Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Grant Paper Box Co., Pittsburgh, Pa.
High Point Paper Box Co., Inc., High Point, N. C.
Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Interstate Folding Box Co., Middletown, Ohio
Lindley Box & Paper Co., Marion, Ind.
Lowman Folding Box Corp., Syracuse, N. Y.
Marathon Corp., Menasha, Wis.
Michigan Carton Co., Battle Creek, Mich.
Morris Paper Mills, Chicago, Ill.
National Metal Edge Box Co., Phila., Pa.
National Paper Box Co., Kansas City, Mo.
Nelson, B. F., Mfg. Co., The, Minneapolis, Minn.
Ohio Boxboard Co., The, Rittman, Ohio
Paper Package Co., Indianapolis, Ind.
Pohlig Bros., Richmond, Va.
Pollock Paper & Box Co., Dallas, Texas
Reynolds Metals Co., Richmond, Va.
Richardson-Taylor-Globe Corp., Cincinnati, Ohio
Robertson Paper Box Co., Montville, Conn.
Schmidt Lithograph Co., San Francisco, Calif.
Schoettle, Edwin J., Co., Phila., Pa.
Schulz, A. Geo., Co., Milwaukee, Wis.
Shuttleworth Carton Co., Inc., New York, N. Y.
Standard Paper Box Corp., Los Angeles, Calif.
Sutherland Paper Co., Kalamazoo, Mich.
Toledo Paper Box Co., The, Toledo, Ohio
United Paperboard Co., New York, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Wilkata Folding Box Co., The, Kearny, N.J.
Wolverine Carton Co., Grand Rapids, Mich.
Zumbiel, C. W., Co., Cincinnati, Ohio

COMPACTS, PAPER

Burt, F. N., Co., Inc., Buffalo, N. Y.
Makdon Co., New York, N. Y.

CONTAINERS, CERAMIC, CLAY, POTTERY

(See Pottery Containers)

CONTAINERS, DEHYDRATED FOOD

(Bulk)

Andrews, O. B., Co., Chattanooga, Tenn.
Arvey Corp., Jersey City, N. J.
Atlas-Boxmakers, Inc., Chicago, Ill.
Beacon Container Co., New York, N. Y.
Betner, Benj. C., Co., Devon, Pa.
Canister Co., Inc., The, Phillipsburg, N. J.
Carpenter Container Corp., Bklyn, N. Y.
Container Co., The, Van Wert, Ohio
Container Corp. of America, Chicago, Ill.
Continental Can Co., New York, N. Y.
Dewey & Almy Chemical Co., Cambridge, Mass.
Fibro Container Corp., Minneapolis, Minn.
Gardner-Richardson Co., The, Middletown, Ohio
Gaylord Container Corp., St. Louis, Mo.
Interstate Folding Box Co., Middletown, Ohio
Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind.

Marathon Corp., Menasha, Wis.
Master Package Corp., The, Owen, Wis.
Moist-R-Proof Container Co., San Francisco, Calif.
Nelson, B. F., Mfg. Co., The, Minneapolis, Minn.
Pacific Can Co., San Francisco, Calif.
Reynolds Metals Co., Richmond, Va.
Shellmar Products Co., Mount Vernon, Ohio
Sutherland Paper Co., Kalamazoo, Mich.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
U. S. Corrugated Fiber Box Co., Indianapolis, Ind.
Visking Corp., The, Chicago, Ill.
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, DEHYDRATED FOODS

(Unit)

Andrews, O. B., Co., Chattanooga, Tenn.
Arvey Corp., Jersey City, N. J.
Berles Carton Co., Inc., Paterson, N. J.
Betner, Benj. C., Co., Devon, Pa.
Bloomer Bros. Co., Newark, New York State
Brown & Bailey Co., Phila., Pa.
Canister Co., Inc., The, Phillipsburg, N. J.
Chicago Carton Co., Chicago, Ill.
Container Corp. of America, Chicago, Ill.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Continental Paper Products Co., Denver, Colo.
Dewey & Almy Chemical Co., Cambridge, Mass.
Fleishhacker Paper Box Co., San Francisco, Calif.
Frankenberg Bros., Inc., Columbus, Ohio
Gardner-Richardson, Co., The, Middletown, Ohio
Gaylord Container Corp., St. Louis, Mo.
Interstate Folding Box Co., Middletown, Ohio
Marathon Corp., Menasha, Wis.
Modern Packages Co., Memphis, Tenn.
Moist-R-Proof Container Co., San Francisco, Calif.
Mott Carton & Paper Co., St. Louis, Mo.
Munson Bag Co., The, Cleveland, Ohio
National Metal Edge Box Co., Phila., Pa.
Nelson, B. F., Mfg. Co., Minneapolis, Minn.
Neostyle, Inc., Chicago, Ill.
Oneida Paper Products, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Ritchie, W. C., & Co., Chicago, Ill.
Royal, Thomas M. & Co., Phila., Pa.
Schmidt Lithograph Co., San Francisco, Calif.
Shellmar Products Co., Mt. Vernon, Ohio
Shuttleworth Carton Co., New York, N. Y.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
U. S. Envelope Co., Springfield, Mass.
U. S. Printing & Lithograph Co., The, Cincinnati, Ohio
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, FROZEN FOODS

(Bulk)

Andrews, O. B., Co., Chattanooga, Tenn.
Arvey Corp., Jersey City, N. J.
Atlanta Paper Co., Atlanta, Ga.
Beacon Container Co., New York, N. Y.
Carpenter Container Corp., Bklyn, N. Y.
Container Co., The, Div. of Container Corp. of America, Chicago, Ill.
Continental Can Co., Inc., Van Wert, Ohio
Dewey & Almy Chemical Co., Cambridge, Mass.
Gardner-Richardson Co., The, Middletown, Ohio
Gaylord Container Corp., St. Louis, Mo.
Kress, F. J., Box Co., Pittsburgh, Pa.
Marathon Corp., Menasha, Wis.
Master Package Corp., The, Owen, Wis.
Moist-R-Proof Container Co., San Francisco, Calif.
Nelson, B. F., Mfg. Co., The, Minneapolis, Minn.
Sealright Co., Inc., The, Fulton, N. Y.
Thompson Can Company, Dallas, Texas
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
U. S. Corrugated Fiber Box Co., Indianapolis, Ind.
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.
Visking Corp., The, Chicago, Ill.
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, FROZEN FOODS

(Unit)

Andrews, O. B., Co., Chattanooga, Tenn.
Arvey Corp., Jersey City, N. J.
Atlantic Carton Corp., Norwich, Conn.
Berles Carton Co., Inc., Paterson, N. J.
Betner, Benj. C., Co., Devon, Pa.
Bloomer Bros. Co., Newark, New York State
Brown & Bailey Co., Phila., Pa.
Chicago Carton Co., Chicago, Ill.
Container Corp. of America, Chicago, Ill.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Continental Paper Products Co., Denver, Colo.
Dewey & Almy Chemical Co., Cambridge, Mass.
Dixie Cup Co., Easton, Pa.
Fleishhacker Paper Box Co., San Francisco, Calif.
Frankenberg Bros., Inc., Columbus, Ohio
Gardner-Richardson Co., The, Middletown, Ohio
Interstate Folding Box Co., Middletown, Ohio
Lily-Tulip Cup Corp., New York, N. Y.
Lowman Folding Box Corp., Syracuse, N. Y.
Marathon Corp., Menasha, Wis.
Modern Packages Co., Memphis, Tenn.
Moist-R-Proof Container Co., San Francisco, Calif.
Mono Containers Div., Continental Can Co., Newark, N. J.
Munson Bag Co., The, Cleveland, Ohio
National Metal Edge Box Co., Phila., Pa.
Nelson, B. F., Mfg. Co., The, Minneapolis, Minn.
Neostyle, Inc., Chicago, Ill.
Oneida Paper Products, Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Royal, Thomas M. & Co., Phila., Pa.
Sealright Co., Inc., The, Fulton, N. Y.
Shellmar Products Co., Mount Vernon, Ohio
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Thompson Can Co., Dallas, Texas
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, MOLDED PULP

Chaspec Mfg. Co., New York, N. Y.
Heminway Corp., Waterbury, Conn.
Holed-Tite Packing Corp., Herkimer, N. Y.
Keyes Fibre Co., Waterville, Me.
Moist-R-Proof Container Co., San Francisco, Calif.
Pulp Reproduction Co., Milwaukee, Wis.
Read, Robert E., Inc., Dexter, N. Y.
Sealright Co., Inc., The, Fulton, N. Y.
Self-Locking Carton Co., Chicago, Ill.
Stevens & Thompson Paper Co., Greenwich, N. Y.

CONTAINERS, PAPER

(Liquid-Holding)

American Can Co., New York, N. Y.
American Lace Paper Co., Milwaukee, Wis.
American Paper Goods Co., The, Kensington, Conn.
Beacon Container Co., New York, N. Y.
Betner, Benj. C., Co., Devon, Pa.
Canister Co., Inc., The, Phillipsburg, N. J.
Continental Bag Specialties Corp., New York, N. Y.
Continental Can Co., Inc., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Dixie-Vortex Co., Easton, Pa.
Gair, Robert, Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Interstate Folding Box Co., Middletown, Ohio
Lily Tulip Cup Corp., New York, N. Y.
Moist-R-Proof Container Co., San Francisco, Calif.
Mono Containers Div., Continental Can Co., Newark, N. J.
Royal, Thomas M. & Co., Phila., Pa.
Schoettle, Edwin, J., Co., Phila., Pa.
Sealright Co., Inc., The, Fulton, N. Y.
Stecher-Traung Litho. Corp., Rochester, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, PAPER

(Milk)

American Can Co., New York, N. Y.
America Paper Bottle Co., Toledo, Ohio
American Sealcone Corp., New York, N. Y.
Brown & Bailey Co., Phila., Pa.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Ex-Cell-O Corp., Detroit, Mich.
Gair, Robert, Co., Inc., New York, N. Y.
Gardner-Richardson Co., The, Middletown, Ohio
Marathon Corp., The, Menasha, Wis.
Oneida Paper Products, Inc., New York, N. Y.
Reed Container Sales Corp., New York, N. Y.
Sealright Co., Inc., The, Fulton, N. Y.
Single Service Containers, Inc., New York, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.

CONTAINERS, PAPER

(Nesting)

American Lace Paper Co., Milwaukee, Wis.
American Paper Goods Co., The, Kensington, Conn.
Bloomer Bros. Co., Newark, New York State
Burt, F. N., Co., Inc., Buffalo, N. Y.
Central States Paper & Bag Co., St. Louis, Mo.
Container Corp. of America, Chicago, Ill.
Continental Can Co., Inc., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Densen-Banner Co., Ridgefield Park, N. J.
Dixie-Vortex Co., Easton, Pa.
High Point Paper Box Co., Inc., High Point, N. C.
Lily Tulip Cup Corp., New York, N. Y.
Marathon Corp., Menasha, Wis.
Mono Containers Div., Continental Can Co., Newark, N. J.
Old Dominion Box Co., Lynchburg, Va.
Randolph Paper Box Co., Richmond, Va.
Rudnick, A & A, Inc., New York, N. Y.
Schoettle, Edwin J., Co., Phila., Pa.
Schulz, A., Geo., Co., Milwaukee, Wis.
Sealright Co., Inc., The, Fulton, N. Y.
Seaman Box Co., Inc., New York, N. Y.

Addresses of companies listed appear on pages 945–955

Stevens & Thompson Paper Co., Greenwich, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Traver Corp., Chicago, Ill.
Warner Bros. Co., The, Bridgeport, Conn.

CONTAINERS, RIGID TRANSPARENT

Atlanta Box Factory, Inc., Atlanta, Ga.
Atlantic Paper Box Co., Boston, Mass.
Birmingham Paper Co., Birmingham, Ala.
Burt, F. N., Co., Inc., Buffalo, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
Celluplastic Corp., Newark, N. J.
Central States Paper & Bag Co., St. Louis, Mo.
Clark, Geo. V., Co., Inc., Long Island City, N. Y.
Clover Box & Mfg. Co., Inc., New York, N. Y.
Design Center, Inc., New York, N. Y.
Gair, Robert Co., Inc., New York, N. Y.
Globe Paper Box Co., Chicago, Ill.
Great American Plastics Co., Leominster, Mass.
Heminway Corp., Waterbury, Conn.
Henry, Ira L., Co., Watertown, Wis.
Lebanon Paper Box Co., Lebanon, Pa.
Leominster Paper Box Co., Leominster, Mass.
Lusteroid Container Co., Inc., So. Orange, N. J.
Miller, Walter P., Co., Inc., Phila., Pa.
Modern Boxes, Inc., Chicago, Ill.
National Metal Edge Box Co., Phila., Pa.
National Transparent Plastics Co., Springfield, Mass.
Neostyle, Inc., Chicago, Ill.
Niemand Bros., Inc., Long Island City, N. Y.
Old Dominion Box Co., Lynchburg, Va.
Owens-Illinois Glass Co., Toledo, Ohio
Parfait Powder Puff Co., Chicago, Ill.
Pedersen, H., Mfg. Co., Los Angeles, Calif.
Ritchie, W. C., & Co., Chicago, Ill.
Shaw Paper Box Co., Pawtucket, R. I.
Shaw-Randall Co., Pawtucket, R. I.
Sillcocks-Miller Co., The, S. Orange, N. J.
Sterling Injection Molding, Inc., Buffalo, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
Texas Paper Box Mfg. Co., Dallas, Texas
Tower Envelope Co., New York, N. Y.
Transparent Specialties Corp., Cleveland, Ohio
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.
U. S. Envelope Co., Springfield, Mass.
Universal Jewelry Case Co., Chicopee, Mass.
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Weinman Bros., Chicago, Ill.
Young, Everett, Co., Providence, R. I.

CONTAINERS, SHIPPING, WEATHERPROOF FIBRE

American Box Board Co., Grand Rapids, Mich.
Andrews, O. B., Co., Chattanooga, Tenn.
Ashtabula Corrugated Box Co., The, Ashtabula, Ohio
Atlanta Paper Co., Atlanta, Ga.
Atlas-Boxmakers, Inc., Chicago, Ill.
Beacon Container Co., New York, N. Y.
Bird & Son, Inc., E. Walpole, Mass.
Carpenter Container Corp., Bklyn, N. Y.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago, Ill.
Crook Paper Box Co., N. Kansas City, Mo.
Erie Corrugated Box Co., The, Erie, Pa.
Fibro Container Corp., Minneapolis, Minn.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Gair, Robert, Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Inland Container Corp., Indianapolis, Ind.
Moist-R-Proof Container Co., San Francisco, Calif.
National Container Corp., Long Island City, N. Y.
National Metal Edge Box Co., Phila., Pa.
Ohio Boxboard Co., The, Rittman, Ohio
Reynolds Metals Co., Richmond, Va.
U. S. Envelope Co., Springfield, Mass.
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, SPECIALTY FLEXIBLE

Moist-R-Proof Container Co., San Francisco, Calif.
Oneida Paper Products, Inc., New York, N. Y.
Royal, Thomas M. & Co., Phila., Pa.
Schorsch & Co., Inc., New York, N. Y.
Shaw-Randall Co., Pawtucket, R. I.
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.

CONTAINERS, VENEER

Anderson Box & Basket Co., New York, N. Y.
Barden & Robeson Corp., Penn Yan, N. Y.
Cummer Graham Co., Paris, Texas
Elberta Crate & Basket Co., Tallahassee, Fla.
Jarrell, B. C., & Co., Humboldt, Tenn.
Leigh Banana Case Co., Ellenton, S. C.
Marvil Package Co., Laurel, Del.
Mid-States Steel & Wire Co., Crawfordsville, Ind.
Nocatee-Manatee Crate Co., Manatee, Fla.
Riverside Mfg. Co., Murfreesboro, N. C.
Saint Joe Machines, Inc., St. Joseph, Mich.
Saranac Machine Co., Benton Harbor, Mich.
Southern Package Corp., Hazlehurst, Miss.
Two States Fruit Package Co., Texarkana, Texas
Verhalen, Walter, Co., Hope, Ark.

CRATES, WOOD & PLYWOOD

Anderson Box & Basket Co., New York, N. Y.

CUPS, PAPER

(Liquid-Holding)

American Lace Paper Co., Milwaukee, Wis.
American Paper Goods Co., The, Kensington, Conn.
Cupples-Hesse Corp., St. Louis, Mo.
Mono Containers Div., Continental Can Co., Newark, N. J.
Sealright Co., Inc., The, Fulton, N. Y.
Sutherland Paper Co., Kalamazoo, Mich.
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.

DISPLAYS, COUNTER

(Merchandise & Dispensing)

Acme Folding Box Co., Inc., New York, N. Y.
Advertising Metal Display Co., Chicago, Ill.
Andrews, O. B., Co., Chattanooga, Tenn.
Animated Display Creators, Minneapolis, Minn.
Arrow Mfg. Co., Inc., Hoboken, N. J.
Arvey Corp., Jersey City, N. J.
Autokraft Box Corp., Hanover, Pa.
Badger Carton Co., Milwaukee, Wis.
Berkowitz, Leon L., Phila., Pa.
Berles Carton Co., Inc., Paterson, N. J.
Brandau-Craig-Dickerson Co., Nashville, Tenn.
Bronzart Metals Co., New York, N. Y.
Brooks & Porter, Inc., New York, N. Y.
Brown & Bailey Co., Phila., Pa.
Burnett, R. L., Co., San Antonio, Texas
Cambridge Paper Box Co., Cambridge, Mass.
Chaspec Mfg. Co., New York, N. Y.
Chicago Cardboard Co., Chicago, Ill.
Clark, Geo. V., Co., Inc., Long Island City, N. Y.
Clover Box & Mfg. Co., Inc., New York, N. Y.
Columbia Paper Box Co., Washington, D.C.
Consolidated Lithographing Corp., Bklyn, N. Y.
Copeland Displays, Inc., New York, N. Y.
Cowles, Harold A., Box & Display Co., Rochester, N. Y.
Design Center, Inc., New York, N. Y.
Displayers, The, New York, N. Y.
Farrington Mfg. Co., Boston, Mass.
Fitzhugh, Wm. W., Inc., New York, N. Y.
Forbes Lithograph Mfg. Co., Boston, Mass.
Fox, C. J., Co., The, Providence, R. I.
Friedman, Art, New York, N. Y.
Fuller Displays, Inc., Long Island City, N. Y.
Gair, Robert, Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Glove Paper Box Co., Chicago, Ill.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Gutterson & Co., Inc., New York, N. Y.
Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Helmco, Inc., Chicago, Ill.
Hinde & Dauch Paper Co., Sandusky, Ohio
Interstate Folding Box Co., Middletown, Ohio
Kay Displays, Inc., New York, N. Y.
Kayton, Robert, Displays, Inc., New York, N. Y.
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Lengsfield Bros., Inc., New Orleans, La.
Leominster Paper Box Co., Leominster, Mass.
Livingston & Co., Inc., New York, N. Y.
Lowman Folding Box Corp., Syracuse, N. Y.
Magill-Weinsheimer Co., Chicago, Ill.
Mandus Co., Inc., New York, N. Y.
Michigan Carton Co., Battle Creek, Mich.
Michigan Lithographing Co., Grand Rapids, Mich.
Milprint, Inc., Milwaukee, Wis.
Modern Packages Co., Memphis, Tenn.
Morris Paper Mills, Chicago, Ill.
Mott Carton & Paper Co., St. Louis, Mo.
Nalco, Inc., New York, N. Y.
National Color Printing Co., Inc., The, Baltimore, Md.
National Folding Box Co., New Haven, Conn.
Nelson, B. F., Mfg. Co., The, Minneapolis, Minn.
New England Box Co., Greenfield, Mass.
Nicoll & Co., San Francisco, Calif.
Oberly & Newell Lithograph Corp., New York, N. Y.
Ohio Boxboard Co., The, Rittman, Ohio
Old Dominion Box Co., Lynchburg, Va.
Philipp Lithographing Co., Milwaukee, Wis.
Pilliod Cabinet Co., The, Swanton, Ohio
Process Displays, Inc., Milwaukee, Wis.
Rathbun Molding Corp., Salamanca, N. Y.
Regent Specialties, Inc., Rochester, N. Y.
Reynolds Metals Co., Richmond, Va.
Rode & Brand, New York, N. Y.
Roesch, Louis, Co., San Francisco, Calif.
Ross Paper Box Co., New York, N. Y.
Schmidt Lithograph Co., San Francisco, Calif.
Schutz, Thom. A., Co., Chicago, Ill.
Shaw Paper Box Co., Pawtucket, R. I.
Shuttleworth Carton Co., New York, N. Y.

Bold-face listings indicate advertisers in this issue

Simplex Paper Box Corp., Lancaster, Pa.
Smith, S. K., Co., Chicago, Ill.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Stensgaard, W. L., & Assocs., Chicago, Ill.
Sterling Offset Co., New York, N. Y.
Trautmann, Bailey & Blampey, New York, N. Y.
U. S. Printing & Lithograph Co., The, Cincinnati, Ohio
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros. Co., The, Bridgeport, Conn.
Weinman Bros., Chicago, Ill.
Wolverine Carton Co., Grand Rapids, Mich.
Young, Everett, Co., Providence, R. I.
Zipprodt, Inc., Chicago, Ill.

DISPLAYS, FLOOR STAND

(Corrugated & Solid Fibre)

American Box Board Co., Grand Rapids, Mich.
Arvey Corp., Jersey City, N. J.
Chicago Cardboard Co., Chicago, Ill.
Consolidated Lithographing Corp., Bklyn, N. Y.
Container Corp. of America, Chicago, Ill.
Continental Container Corp., Bklyn, N. Y.
Corro-Lith Corp., Long Island City, N. Y.
Display Finishing Co., Inc., Long Island City, N. Y.
Eddy Paper Corp., The, Chicago, Ill.
Edwards & Deutsch Lithographing Co., Chicago, Ill.
Excelsior Paper Specialties Co., New York, N. Y.
Federal Carton Corp., New York, N. Y.
Forbes Lithograph Mfg. Co., Boston, Mass.
Fuller Displays, Inc., Long Island City, N. Y.
Gair, Robert, Co., Inc., New York, N. Y.
Gaylord Container Corp., St. Louis, Mo.
Gereke-Allen Carton Co., St. Louis, Mo.
Grand-City Container Corp., New York, N. Y.
Hankins Container Co., Cleveland, Ohio
Helmco, Inc., Chicago, Ill.
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Inland Container Corp., Indianapolis, Ind.
Kayton, Robert, Displays, Inc., New York, N. Y.
Keystone Box Co., Pittsburgh, Pa.
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Kress, F. J., Box Co., Pittsburgh, Pa.
Magill-Weinsheimer Co., Chicago, Ill.
Milprint, Inc., Milwaukee, Wis.
National Container Corp., Long Island City, N. Y.
Nelson, B. F., Mfg. Co., The, Minneapolis, Minn.
Niagara Lithograph Co., Buffalo, N. Y.
Oberly & Newell Lithograph Corp., New York, N. Y.
Ohio Boxboard Co., The, Rittman, Ohio
Old Dominion Box Co., Lynchburg, Va.
Ottawa River Paper Co., The, Toledo, Ohio
Philipp Lithographing Co., Milwaukee, Wis.
Process Displays, Inc., Milwaukee, Wis.
Regent Specialties, Inc., Rochester, N. Y.
Reyburn Mfg. Co., Inc., The, Phila., Pa.
Reynolds Metals Co., Richmond, Va.
Roesch, Louis, Co., San Francisco, Calif.
Rode and Brand, New York, N. Y.
Schmidt Lithograph Co., San Francisco, Calif.
Schutz, Thom. A., Co., Chicago, Ill.
Sherman Paper Products Corp., Newton Upper Falls, Mass.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Stensgaard, W. L., & Associates, Inc., Chicago, Ill.
Waldorf Paper Products Co., St. Paul, Minn.

DISPLAYS, METAL, SHEET

Advertising Metal Display Co., Chicago, Ill.
American Can Co., New York, N. Y.
Animated Display Creators, Minneapolis, Minn.
Arvey Corp., Jersey City, N. J.
Bronzart Metals Co., New York, N. Y.
Design Center, Inc., New York, N. Y.
Farrington Mfg. Co., Boston, Mass.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Heekin Can Co., Cincinnati, Ohio
Helmco, Inc., Chicago, Ill.
Kay Displays, Inc., New York, N. Y.
Kayton, Robert, Displays, Inc., New York, N. Y.
Mason Can Co., E. Providence, R. I.
Process Displays, Inc., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.

DISPLAYS, WINDOW & COUNTER

Advertising Metal Display Co., Chicago, Ill.
Animated Display Creators, Minneapolis, Minn.
Arrow Mfg. Co., Inc., Hoboken, N. J.
Arvey Corp., Jersey City, N. J.
Badger Carton Co., Milwaukee, Wis.
Berkowitz, Leon L., Phila., Pa.
Brandau-Craig-Dickerson Co., Nashville, Tenn.
Cambridge Paper Box Co., Cambridge, Mass.
Central Lithograph Co., The, Cleveland, Ohio
Chaspec Mfg. Co., New York, N. Y.
Chicago Cardboard Co., Chicago, Ill.
Clark, Geo., V., Co., Inc., Long Island City, N. Y.
Clover Box & Mfg. Co., Inc., New York, N. Y.
Consolidated Lithographing Corp., Bklyn, N. Y.
Copeland Displays, Inc., New York, N. Y.
Courier Journal Job Printing Co., Louisville, Ky.
Cowles, Harold A., Box & Display Co., Rochester, N. Y.
Design Center, Inc., New York, N. Y.
Displayers, The, New York, N. Y.
Electric City Box Co., Buffalo, N. Y.
Empire Lithographing Co., Inc., New York, N. Y.
Farrington Mfg. Co., Boston, Mass.
Forbes Lithograph Mfg. Co., Boston, Mass.
Friedman, Art, New York, N. Y.
Fuller Displays, Inc., Long Island City, N. Y.
Gair, Robert, Co., Inc., New York, N. Y.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Hinde & Dauch Paper Co., The, Sandusky, Ohio
Inland Lithograph Co., Chicago, Ill.
Kay Displays, Inc., New York, N. Y.
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Leominster Paper Box Co., Leominster, Mass.
Lowman Folding Box Corp., Syracuse, N. Y.
Magill-Weinsheimer Co., Chicago, Ill.
Modern Packages Co., Memphis, Tenn.
Nalco, Inc., New York, N. Y.
National Color Printing Co., Inc., Baltimore, Md.
Nelson, B. F., Mfg. Co., The, Minneapolis, Minn.
Oberly & Newell Lithograph Corp., New York, N. Y.
Old Dominion Box Co., Lynchburg, Va.
Philipp Lithographing Co., Milwaukee, Wis.
Process Displays, Inc., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.
Rode & Brand, New York, N. Y.
Roesch, Louis, Co., San Francisco, Calif.
Shuttleworth Carton Co., New York, N. Y.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sterling Offset Co., New York, N. Y.
U. S. Printing & Lithograph Co., The, Cincinnati, Ohio
Waldorf Paper Products Co., St. Paul, Minn.
Warner Bros., Co., The, Bridgeport, Conn.
Zipprodt, Inc., Chicago, Ill.

DISPLAYS, WIRE

Grammes, L. F., & Sons, Inc., Allentown, Pa.
Gray Wire Specialty Co., The, Cleveland, Ohio
Kay Displays, Inc., New York, N. Y.
Stecher-Traung Lithograph Corp., San Francisco, Calif.
Union Steel Products Co., Albion, Mich.
Washburn Co., The, Worcester, Mass.

DRUMS, FIBRE

Beacon Container Co., New York, N. Y.
Bird & Son, Inc., E. Walpole, Mass.
Canister Co., Inc., The, Phillipsburg, N. J.
Carpenter Container Corp., Bklyn, N. Y.
Cleveland Container Co., The, Cleveland, Ohio
Consolidated Paper Co., Monroe, Mich.
Container Co., The, Div. of Continental Can Co., Inc., Van Wert, Ohio
Container Corp. of America, Chicago, Ill.
Continental Can Co., Inc., New York, N. Y.
Fibreboard Products, Inc., San Francisco, Calif.
Fibro Container Corp., Minneapolis, Minn.
Gardner-Richardson Co., The, Middletown, Ohio
Gates Paper Co., Ltd., Los Angeles, Calif.
Gaylord Container Corp., St. Louis, Mo.
Keystone Fibre Drum Co., Pittsburgh, Pa.
Loroco Industries, Inc., Reading, Ohio
Master Package Corp., The, Owen, Wis.

DRUMS, METAL

Aluminum Co. of America, Pittsburgh, Pa.
American Can Co., New York, N. Y.
Central Can Co., Chicago, Ill.
Central Can Co., Inc., Kansas City, Mo.
Continental Can Co., Inc., New York, N. Y.
Crown Can Co., Phila., Pa.
Ellis, George D., & Sons, Inc., Phila., Pa.
Heekin Can Co., Cincinnati, Ohio
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Owens-Illinois Can Co., Toledo, Ohio
Republic Steel Corp., Cleveland, Ohio
Reynolds Metals Co., Richmond, Va.
Sexton Can Co., Everett, Mass.
Thompson Can Company, Dallas, Texas
Vulcan Stamping & Mfg. Co., Bellwood, Ill.
Wheeling Corrugating Co., Wheeling, W. Va.
Wilson & Bennett Mfg. Co., The, Chicago, Ill.

DRUMS, PLYWOOD

Seymour & Peck, Co., Chicago, Ill.

ENVELOPES, CLOTH & COTTON-LINED PAPER

American Paper Goods Co., The, Kensington, Conn.
Andrews, P. L., Corp., Bklyn, N. Y.
Atlanta Box Factory, Inc., Atlanta, Ga.
Cottonluxe Mfg. Co., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Herz, Alexander, Co., Inc., New York, N. Y.
Tension Envelope Corp., New York, N. Y.
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.
Varey-Shea Bag Corp., Elizabeth, N. J.

Addresses of companies listed appear on pages 945–955

ENVELOPES, MERCHANDISE DISPLAY

American Paper Goods Co., The, Kensington, Conn.
Andrews, P. L., Corp., Bklyn, N. Y.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Continental Bag Specialties Corp., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Disbrow Mfg. Co., Inc., Newark, N. J.
Mason Envelope Co., New York, N. Y.
Neostyle, Inc., Chicago, Ill.
Oneida Paper Products, Inc., New York, N. Y.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Talmadge Printing Co., New York, N. Y.
Tension Envelope Corp., Kansas City, Mo.
Tower Envelope Co., New York, N. Y.
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.

ENVELOPES, STRING & BUTTON CLOSURE

American Paper Goods Co., The, Kensington, Conn.
Cupples-Hesse Corp., St. Louis, Mo.
Disbrow Mfg. Co., Inc., Newark, N. J.
Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind.
Mason Envelope Co., New York, N. Y.
Talmadge Printing Co., New York, N. Y.
Tension Envelope Corp., Kansas City, Mo.
Tower Envelope Co., New York, N. Y.
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.

ENVELOPES, TRANSPARENT

Alderman Paper Box Corp., Rochester, N. Y.
American Paper Goods Co., The, Kensington, Conn.
Andrews, P. L., Corp., Bklyn, N. Y.
Berkowitz Envelope Co., Kansas City, Mo.
Central States Paper & Bag Co., St. Louis, Mo.
Clark, Geo. V., Co., Inc., Long Island City, N. Y.
Clover Box & Mfg. Co., Inc., New York, N. Y.
Colonial Envelope Co., New York, N. Y.
Comet Envelope & Paper Co., Inc., New York, N. Y.
Continental Bag Spec. Corp., New York, N. Y.
Crystal Transparent Mfg. Co., Inc., New York, N. Y.
Crystal Tube Mfg. Corp., Chicago, Ill.
Cupples-Hesse Corp., St. Louis, Mo.
Dennison Mfg. Co., Framingham, Mass.
Disbrow Mfg. Co., Inc., Newark, N. J.
Dobeckmun Co., The, Cleveland, Ohio
Herz, Alexander, Co., Inc., New York, N. Y.
Humitube Mfg. Co., Peoria, Ill.
Interstate Folding Box Co., Middletown, Ohio
Ivers-Lee Co., Newark, N. J.
Mason Envelope Co., New York, N. Y.
Mehl Mfg. Co., Cincinnati, Ohio
Milprint, Inc., Milwaukee, Wis.
Moist-R-Proof Container Co., San Francisco, Calif.
Munson Bag Co., The, Cleveland, Ohio
National Transparent Plastics Co., Springfield, Mass.
Neostyle, Inc., Chicago, Ill.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Oneida Paper Products, Inc., New York, N. Y.
Parfait Powder Puff Co., Chicago, Ill.
Print-A-Tube Co., Passaic, N. J.
Royal, Thomas M., & Co., Phila., Pa.
Seaman Box Co., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Sillcocks-Miller Co., The, S. Orange, N. J.
Talmadge Printing Co., New York, N. Y.
Tension Envelope Corp., New York, N. Y.
Tower Envelope Co., New York, N. Y.
Trans-Pac Services, Inc., New York, N. Y.
Transparent Specialties Corp., Cleveland, Ohio
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Pkg. Div., Phila., Pa.
U. S. Envelope Co., Kellogg Container Div., Springfield, Mass.

JARS, GLASS

Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Braun, W., Co., Chicago, Ill.
Brockway Glass Co., Inc., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Glass Containers, Inc., Los Angeles, Calif.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Sager Bros., New York, N. Y.
Swindell Brothers, Baltimore, Md.
Wheaton, T. C., Co., Millville, N. J.

JARS, OPAL

Anchor Hocking Glass Corp., Lancaster, Ohio
Braun, W., Co., Chicago, Ill.
Carr-Lowrey Glass Co., Baltimore, Md.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Sager Bros., New York, N. Y.
Wheaton, T. C., Co., Millville, N. J.

PACKETS

American Paper Goods Co., The, Kensington, Conn.
Andrews, P. L., Co., Bklyn, N. Y.
Berkowitz Envelope Co., Kansas City, Mo.
Bradner Smith & Co., Chicago, Ill.
Brooks & Porter, Inc., New York, N. Y.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Continental Bag Specialties Corp., New York, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Dennison Mfg. Co., Framingham, Mass.
Disbrow Mfg. Co., Inc., Newark, N. J.
Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Humitube Mfg. Co., Peoria, Ill.
Mason Envelope Co., New York, N. Y.
Neostyle, Inc., Chicago, Ill.
Oneida Paper Prods., Inc., New York, N. Y.
Reynolds Metals Co., Richmond, Va.
Royal Paper Corp., New York, N. Y.
Schmidt, Henry & Bro., Inc., Phila., Pa.
Stecher-Traung Litho. Corp., Rochester, N. Y.
Tension Envelope Corp., New York, N. Y.
Tower Envelope Co., New York, N. Y.
Traver Corp., Chicago, Ill.
U. S. Envelope Co., Springfield, Mass.
Wolf Bros., Phila., Pa.

POTTERY CONTAINERS

Andrews, O. B., Co., Chattanooga, Tenn.
Floramics Co., The, Tampa, Fla.
Greene's Ceramic Products Co., Inc., Sebring, Ohio
Hull, A. E., Pottery Co., Crooksville, Ohio
Na-Mac Products Corp., Los Angeles, Calif.
Purinton Pottery Co., Wellesville, Ohio
Robinson Clay Product Co., The, New York, N. Y.
Spaulding China Co., Inc., Sebring, Ohio
Western Stoneware Co., Monmouth, Ill.
Zanesville Stoneware Co., Zanesville, Ohio

SHIPPING CONTAINERS

(See Bags, Multiwall Heavy Duty)
(See Boxes, Corrugated & Solid Fibre)
(See Containers, Shipping, Weatherproof Fibre)
(See Drums—Fibre, Metal & Plywood)

TUBES, COLLAPSIBLE

(Aluminum, Lead, Tin & Alloys)

Aluminum Co. of America, Pittsburgh, Pa.
Art Tube Co., Inc., Irvington, N. J.
National Collapsible Tube Co., Providence, R. I.
New England Collapsible Tube Co., Chicago, Ill.
Peerless Tube Co., Bloomfield, N. J.
Reynolds Metals Co., Richmond, Va.
Standard Specialty & Tube Co., New Brighton, Pa.
Sun Tube Corp., Hillside, N. J.
Turner White Metal Co., Inc., New Brunswick, N. J.
Victor Metal Products Corp., Bklyn, N. Y.
Wheeling Stamping Co., Wheeling, W. Va.
White Metal Mfg. Co., Hoboken, N. J.
Wirz, A. H., Inc., Chester, Pa.

TUBES, FIBRE

Beacon Container Co., New York, N. Y.
Burt, F. N., Co., Inc., Buffalo, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
Canister Co., Inc., The, Phillipsburg, N. J.
Carpenter Container Corp., Bklyn, N. Y.
Clark, Geo. V., Inc., Long Island City, N. Y.
Cleveland Container Co., The, Cleveland, Ohio
Gates Paper Co., Ltd., Los Angeles, Calif.
Heminway Corp., Waterbury, Conn.
Indianapolis Paper Container Co., Indianapolis, Ind.
Niemand Bros., Inc., Long Island City, N. Y.
Old Dominion Box Co., Lynchburg, Va.
R. C. Can Co., St. Louis, Mo.
Ritchie, W. C., & Co., Chicago, Ill.
Sefton Fibre Can Co., St. Louis, Mo.
Sutherland Paper Co., Kalamazoo, Mich.

TUBES, PLASTIC

Celluplastic Corp., Newark, N. J.
Clark, Geo. V., Co., Inc., Long Island City, N. Y.
General Electric Co., Plastics Div., Pittsfield, Mass.
Great American Plastics Co., Leominster, Mass.
Heat Seal-It Co., Phila., Pa.
Hychex Products, Chicago, Ill.
Lusteroid Container Co., Inc., S. Orange, N. J.
Mack Molding Co., Wayne, N. J.
National Transparent Plastics Co., Springfield, Mass.
Transparent Specialties Corp., Cleveland, Ohio
Visking Corp., The, Chicago, Ill.

TUMBLERS

(Glass)

Anchor Hocking Glass Corp., Lancaster, Ohio
Ball Bros. Co., Muncie, Ind.
Corning Glass Works, Corning, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Libby Glass Mfg. Co., Toledo, Ohio
Owens-Illinois Glass Co., Toledo, Ohio
Tygart Valley Glass Co., Washington, Pa.

VIALS, GLASS

Brockway Glass Co., Inc., Brockway, Pa.
Glass Industries, Inc., New York, N. Y.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Kimble Glass Co., Vineland, N. J.
Owens-Illinois Glass Co., Toledo, Ohio
Pennsylvania Glass Products Co., Pittsburgh, Pa.
Sager Bros., New York, N. Y.
Wheaton, T. C., Co., Millville, N. J.

VIALS, METAL

Aluminum Container Corp., Fulton, N. Y.
American Aluminum Ware Co., Newark, N. J.
Art Tube Co., Inc., Irvington, N. J.
Clark, J. L., Mfg. Co., Rockford, Ill.
Sun Tube Corp., Hillside, N. J.
Victor Metal Products Corp., Bklyn, N. Y.

VIALS, SEMI-RIGID TRANSPARENT

Celluplastic Corp., Newark, N. J.
Lusteroid Container Co., Inc., S. Orange, N. J.
National Transparent Box Co., Springfield, Mass.
Texas Paper Box Mfg. Co., Dallas, Texas
Transparent Specialties Corp., Cleveland, Ohio

Machinery and Equipment

CONVEYORS

Alvey-Ferguson Co., The, Cincinnati, Ohio
American Machine & Foundry Co., New York, N. Y.
Amsco Packaging Machinery Inc., Long Island City, N. Y.
Burt Machine Co., Baltimore, Md.
Chain Belt Co., Milwaukee, Wis.
Chisholm-Ryder Co., Inc., New Way Div., Hanover, Pa.
Container Equipment Corp., Newark, N. J.
Crown Cork & Seal Co., Baltimore, Md.
Ferguson, J. L., Co., Joliet, Ill.
Gump, B. F., Co., Chicago, Ill.
Horix Mfg. Co., Pittsburgh, Pa.
Hulbert Engineering Corp., Watertown, Wis.
Island Equipment Corp., New York, N. Y.
Jeffrey Mfg. Co., The, Columbus, Ohio
Lamson Corp., Syracuse, N. Y.
Link-Belt Co., Chicago, Ill.
Liquid Carbonic Corp., The, Chicago, Ill.
Logan Co., Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
McGuire, Walter, Bklyn, N. Y.
Mercer-Robinson, New York, N. Y.
Mojonnier Bros. Co., Chicago, Ill.
Palmer, Frank D., Inc., Chicago, Ill.
Rapids-Standard Co., Inc., The, Grand Rapids, Mich.
Smith & Winchester Mfg. Co., S. Windham, Conn.
Standard Conveyor Co., N. St. Paul, Minn.
Standard-Knapp Corp., Portland, Conn.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
U. S. Bottlers Machinery Co., Chicago, Ill.
U. S. Rubber Co., New York, N. Y.
Vac-Spray Machine Co., Minneapolis, Minn.
Vertex Co., New York, N. Y.
Waldron, John, Corp., New Brunswick, N. J.
Weigh Right Automatic Scale Co., Joliet, Ill.

CONVEYORS, PORTABLE

Alvey-Ferguson Co., The, Cincinnati, Ohio
American Machine & Foundry Co., New York, N. Y.
Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Horix Mfg. Co., Pittsburgh, Pa.
Hulbert Engineering Corp., Watertown, Wis.
Island Equipment Corp., New York, N. Y.
Jeffrey Mfg. Co., The, Columbus, Ohio
Lamson Corp., Syracuse, N. Y.
Link-Belt Co., Chicago, Ill.
Logan Co., Louisville, Ky.
Mathews Conveyor Co., Ellwood City, Pa.
Paslode Co., Chicago, Ill.
Rapids-Standard Co., Inc., The, Grand Rapids, Mich.
Scientific Filter Co., New York, N. Y.
Standard Conveyor Co., N. St. Paul, Minn.
Syntron Co., Homer City, Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Bottlers Machinery Co., Chicago, Ill.
Vac-Spray Machine Co., Minneapolis, Minn.
Vertex Co., New York, N. Y.
Weigh Right Automatic Scale Co., Joliet, Ill.

DIES, PAPER CUTTING

Champlain Co., Inc., New York, N. Y.
Ferguson, J. L., Co., Joliet, Ill.
Freedman, William A., Die Cutters, New York, N. Y.
Genesee Finishing Corp., Rochester, N. Y.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Helmold, J. F., & Bro., Inc., Chicago, Ill.
Indianapolis Paper Container Co., Indianapolis, Ind.
Inman Mfg. Co., Inc., Amsterdam, N. Y.
Lansky Die Cutting Co., New York, N. Y.
Parry, Samuel R., Machine Co., Rochester, N. Y.
Pohling Bros., Richmond, Va.
U. S. Finishing & Mfg. Co., Chicago, Ill.

EMBOSSING ROLLS, PAPER

Bingham Bros. Co., New York, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Marconetti, A. E., Inc., New York, N. Y.
Moyer & Pratt, Inc., Lyons Falls, N. Y.
Rotogravure Engineering Co., E. Boston, Mass.
Waldron, John, Corp., New Brunswick, N. J.

EQUIPMENT, MATERIALS HANDLING

Alvey-Ferguson Co., Inc., Cincinnati, Ohio
Barrett-Cravens Co., Chicago, Ill.
Chain Belt Co., Milwaukee, Wis.
Island Equipment Corp., New York, N. Y.
Lamson Corp., Syracuse, N. Y.
Lewis-Shephard, Watertown, Mass.
Link-Belt Co., Chicago, Ill.
Mercer-Robinson Co., Inc., New York, N. Y.
Rapids-Standard Co., Inc., The, Grand Rapids, Mich.
Yale & Towne Mfg. Co., The, Phila., Pa.

HAMMERS & TACKERS, AUTOMATIC FEED

Acme Staple Co., Camden, N. J.
Bostitch, Inc., F. Greenwich, R. I.
Harris-Seybold-Potter Co. Seybold Div., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
Paslode Co., Chicago, Ill.

MACHINES, AMPOULE FILLING & SEALING

Palmer, Frank D., Inc., Chicago, Ill.
PerfeKtum Products Co., New York, N. Y.
Scientific Filter Co., New York, N. Y.

MACHINES, AMPOULE WASHING

Lakso Company, Fitchburg, Mass.
PerfeKtum Products Co., New York, N. Y.
U. S. Bottlers Machinery Co., Chicago, Ill.

MACHINES, BAG & ENVELOPE CLOSING & SEALING

Acme Staple Co., Camden, N. J.
Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Bagpak, Inc., New York, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Betner, Benj. C., Co., Devon, Pa.
Bostitch, Inc., East Greenwich, R. I.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Cleveland Lathe & Machine Co., Cleveland, Ohio
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Container Equipment Corp., Newark, N. J.
Goat, Fred, Co., Inc., The, Bklyn, N. Y.
Gump, B. F., Co., Chicago, Ill.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Heat Seal-It Co., Phila., Pa.
International Paper Products, Div., of International Paper Co., New York, N. Y.
Ivers-Lee Co., Newark, N. J.
M & R Mfg. Co., Mansfield, Ohio
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Modern Containers, Inc., Los Angeles, Calif.
Package Machinery Co., Springfield, Mass.
Pack-Rite Machines, Milwaukee, Wis.
Palmer, Frank D., Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Redington, F. B., Co., Chicago, Ill.
Richard Machine Co., Battle Creek, Mich.
St. Regis Paper Co., New York, N. Y.
Saranac Machine Co., Benton Harbor, Mich.
Sav-Way Industries, Detroit, Mich.
Simplex Wrapping Machine Co., Oakland, Calif.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
Vertex Co., New York, N. Y.
Wrap-Ade Machine Co., Newark, N. J.
Wright's Automatic Machinery Co., Durham, N. C.

Addresses of companies listed appear on pages 945–955

MACHINES, BAG & ENVELOPE FILLING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Automatic Scale Co., Inc., New York, N. Y.
Ayers, John W., & Son, Bloomfield, N. J.
Bagpak, Inc., New York, N. Y.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Ferguson, J. L., Co., Joliet, Ill.
Goat, Fred, Co., Inc., The, Bklyn, N. Y.
Gump, B. F., Co., Chicago, Ill.
International Paper Products Div. of International Paper Co., New York, N. Y.
Ivers-Lee Co., Newark, N. J.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Pack-Rite Machines, Milwaukee, Wis.
Palmer, Frank D., Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Redington, F. B., Co., Chicago, Ill.
Richard Machine Co., Battle Creek, Mich.
St. Regis Paper Co., New York, N. Y.
Simplex Wrapping Machine Co., Oakland, Calif.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Weigh Right Automatic Scale Co., Joliet, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, BAG & ENVELOPE MAKING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Hayssen Mfg. Co., Sheboygan, Wis.
Heinrich, H. H., Inc., New York, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Ivers-Lee Co., Newark, N. J.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Modern Containers, Inc., Los Angeles, Calif.
Package Machinery Co., Springfield, Mass.
Palmer, Frank D., Inc., Chicago, Ill.
Peters Machinery Co., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Richard Machine Co., Battle Creek, Mich.
Simplex Wrapping Machine Co., Oakland, Calif.
Smith & Winchester Mfg. Co., S. Windham, Conn.
Smithe, F. L., Machine Co., Inc., New York, N. Y.
Staude, E. G., Mfg. Co., St. Paul, Minn.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Waldron, John, Corp., New Brunswick, N. J.
Weber, H. G., & Co., Inc., Kiel, Wis.
Wrap-Ade Machine Co., Inc., Newark, N. J.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, BAG SEWING

Bagpak, Inc., New York, N. Y.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
International Paper Products Div. of International Paper Co., New York, N. Y.
Potdevin Machine Co., Bklyn, N. Y.
St. Regis Paper Co., New York, N. Y.

MACHINES, BAG STAPLING

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bates Mfg. Co., The, New York, N. Y.
Bostitch, Inc., E. Greenwich, R. I.
Dexter Folder Co., New York, N. Y.
Globe Mfg. Co., Phila., Pa.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
Paslode Co., Chicago, Ill.
Saranac Machine Co., Benton Harbor, Mich.

MACHINES, BANDING & WIRE STRAPPING

Acme Steel Co., Chicago, Ill.
Gerrard Steel Strapping Co., Chicago, Ill.
Knowlton, M. D., Co., Rochester, N. Y.
Scandia Mfg. Co., N. Arlington, N. J.
Stanley Works, The, New Britain, Conn.
Stapling Machines Co., Rockaway, N. J.

MACHINES, BOTTLE CLEANING
(Air)

Kiefer, Karl, Machine Co., The, Cincinnati, Ohio
Mojonnier Bros. Co., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
U. S. Bottlers Machinery Co., Chicago, Ill.

MACHINES, BOTTLE CLEANING
(Washing)

Kiefer, Karl, Machine Co., Cincinnati, Ohio
Liquid Carbonic Corp., The, Chicago, Ill.
U. S. Bottlers Machinery Co., Chicago, Ill.

MACHINES, BOX COLLAPSING

International Paper Box Machine Co., The, Nashua, N. H.
Staude, E. G., Mfg. Co., St. Paul, Minn.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.

MACHINES, BOX MAKING
(Set-Up)

Globe Mfg. Co., Phila., Pa.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Inman Mfg. Co., Inc., Amsterdam, N. Y.
Knowlton, M. D., Co., Rochester, N. Y.
National Metal Edge Box Co., Phila., Pa.
New Jersey Machine Corp., Hoboken, N. J.
Palmer, Frank D., Inc., Chicago, Ill.
Parry, Samuel R., Machine Co., Rochester, N. Y.
Potdevin Machine Co., Bklyn, N. Y.
Redington Co., F. B., Chicago, Ill.
Stokes & Smith Co., Phila., Pa.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.

MACHINES, BOX WINDOW APPLYING

Champlain Co., Inc., New York, N. Y.
International Paper Box Machine Co., The, Nashua, N. H.
New Jersey Machine Corp., Hoboken, N. J.
Smithe, F. L., Machine Co., Inc., New York, N. Y.
Staude, E. G., Mfg. Co., St. Paul, Minn.
Stokes & Smith Co., Phila., Pa.

MACHINES, CAN CAPPING

Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Crown Cork & Seal Co., Baltimore, Md.
Elgin Mfg. Co., Elgin, Ill.
Ferguson, J. L., Co., Joliet, Ill.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Kiefer, Karl, Machine Co., The, Cincinnati, Ohio
Liquid Carbonic Corp., The, Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Scientific Filter Co., New York, N. Y.
Stokes & Smith Co., Phila., Pa.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
U. S. Bottlers Machinery Co., Chicago, Ill.
William Sealing Corp., Decatur, Ill.

MACHINES, CAN CLOSING & SEALING

American Can Co., New York, N. Y.
Ams, Max, Machine Co., The, Bridgeport, Conn.
Amsco Packaging Machinery, Inc., New York, N. Y.
Canister, Co., Inc., The, Phillipsburg, N. J.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Continental Can Co., Inc., New York, N. Y.
Crown Can Co., Phila., Pa.
Ferguson, J. L., Co., Joliet, Ill.
Gates Paper Ltd., Los Angeles, Calif.
Heekin Can Co., Cincinnati, Ohio
Kiefer, Karl, Machine Co., The, Cincinnati, Ohio
National Can Corp., New York, N. Y.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.

MACHINES, CAN FILLING, LIQUID

Alsop Engineering Corp., New York, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Colton, Arthur, Co., Detroit, Mich.
Crown Cork & Seal Co., The, Baltimore, Md.
Elgin Mfg. Co., Elgin, Ill.
Ertel Engineering Corp., Kingston, N. Y.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Horix Manufacturing Co., Pittsburgh, Pa.
Kiefer, Karl, Machine Co., The, Cincinnati, Ohio
Liquid Carbonic Corp., The, Chicago, Ill.
Mojonnier Bros. Co., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Scientific Filter Co., New York, N. Y.
Stokes, F. J., Machine Co., Phila., Pa.
U. S. Bottlers Machinery Co., Chicago, Ill.
Vol-U-Meter Co., The, Buffalo, N. Y.

MACHINES, CAN LABELING

Burt Machine Co., Baltimore, Md.
Chisholm-Ryder Co., Inc., New Way Div., Hanover, Pa.
Ferguson, J. L., Co., Joliet, Ill.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Glue Fast Equipment Co., Inc., New York, N. Y.
Knowlton, M. D., Co., Rochester, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
New Jersey Machine Corp., Hoboken, N. J.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Scientific Filter Co., New York, N. Y.
Standard-Knapp Corp., Portland, Conn.
Vertex Co., New York, N. Y.

XUM

MACHINES, CAN WRAPPING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Burt Machine Co., Baltimore, Md.
Ferguson, J. L., Co., Joliet, Ill.
Knowlton, M. D., Co., Rochester, N. Y.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Package Machinery Co., Springfield, Mass.
Redington, F. B., Co., Chicago, Ill.
Richard Machine Co., Battle Creek, Mich.
Standard-Knapp Corp., Portland, Conn.

MACHINES, CAP & COVER LINING

Ams, Max, Machine Co., Bridgeport, Conn.
Dewey & Almy Chemical Co., Cambridge, Mass.

MACHINES, CAPPING

Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Seal Co., New Kensington, Pa.
American Seal-Kap Corp., Long Island City, N. Y.
Anchor Hocking Glass Corp., Lancaster, Ohio
Aridor Co., The, Chicago, Ill.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Crown Can Co., Phila., Pa.
Crown Cork & Seal Co., Baltimore, Md.
Elgin Mfg. Co., Elgin, Ill.
Ferguson, J. L., Co., Joliet, Ill.
Goat, Fred, Co., Inc., The, Bklyn, N. Y.
Heekin Can Co., Cincinnati, Ohio
Horix Mfg. Co., Pittsburgh, Pa.
Kiefer, Karl, Machine Co., The, Cincinnati, Ohio
Liquid Carbonic Corp., The, Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Resina Automatic Machinery Co., Inc., Bklyn, N. Y.
Scientific Filter Co., New York, N. Y.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
U. S. Bottlers Machinery Co., Chicago, Ill.
Williams Sealing Corp., Decatur, Ill.

MACHINES, CAPSULE WRAPPING

Ivers-Lee Co., Newark, N. J.
New Jersey Machine Corp., Hoboken, N. J.

MACHINES, CARTON FORMING, LINING, FILLING, FOLDING, CLOSING & SEALING

Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Bostitch, Inc., E. Greenwich, R. I.
Container Equipment Corp., Newark, N. J.
Ex-Cell-O Corp., Detroit, Mich.
Ferguson, J. L., Co., Joliet, Ill.
International Paper Box Machine Co., The, Nashua, N. H.
Interstate Folding Box Co., Middletown, Ohio
National Metal Edge Box Co., Phila., Pa.
Pack-Rite Machines, Milwaukee, Wis.
Palmer, Frank D., Inc., Chicago, Ill.
Peters Machinery Co., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Redington, F. B., Co., Chicago, Ill.
Ross, A. H., Co., Ludlow, Ky.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Weigh Right Automatic Scale Co., Joliet, Ill.

MACHINES, CARTON LOADING (CARTONERS)

Burt Machine Co., Baltimore, Md.
Container Equipment Corp., Newark, N. J.
Goat, Fred, Co., Inc., The, Bklyn, N. Y.
Jeffrey Mfg. Co., The, Columbus, Ohio
Jones, R. A., Co., Covington, Ky.
Palmer, Frank D., Inc., Chicago, Ill.
Redington, F. B., Co., Chicago, Ill.
Ross, A. H., Co., Ludlow, Ky.
Standard-Knapp Corp., Portland, Conn.
Stokes & Smith Co., Phila., Pa.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.

MACHINES, CASE LOADING

Better Packages, Inc., Shelton, Conn.
Burt Machine Co., Baltimore, Md.
Chisholm-Ryder Co., Inc., New Way Div., Hanover, Pa.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Container Equipment Corp., Newark, N. J.
Crown Cork & Seal Co., Baltimore, Md.
Ferguson, J. L., Co., Joliet, Ill.
Horix Mfg. Co., Pittsburgh, Pa.
Palmer, Frank D., Inc., Chicago, Ill.
Standard-Knapp Corp., Portland, Conn.

MACHINES, CASE PRINTING

Ferguson, J. L., Co., Joliet, Ill.
Gottscho, Adolph, Inc., New York, N. Y.
Hooper, F. X., Co., Inc., Glenarm, Md.
Langston, Samuel M., Co., Camden, N. J.
Standard-Knapp Corp., Portland, Conn.
Swift, G. W., Jr., Inc., Bordentown, N. J.

MACHINES, CASE SEALING
(Glue)

A-B-C Packaging Machine Co., Quincy, Ill.
Dexter Folder Co., New York, N. Y.
Ferguson, J. L., Co., Joliet, Ill.
Kiefer, Karl, Machine Co., The, Cincinnati, Ohio
Palmer, Frank D., Inc., Chicago, Ill.
Standard-Knapp Corp., Portland, Conn.

MACHINES, CASE SEALING
(Gummed Tape)

Arenco Machine Co., Inc., New York, N. Y.
Better Packages, Inc., Shelton, Conn.
Gummed Tape & Devices Co., Bklyn., N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Nashua Package Sealing Co., Inc., Nashua, N. H.
Rexford Paper Co., Milwaukee, Wis.
Seal, Inc., Shelton, Conn.
Vertex Co., New York, N. Y.

MACHINES, CASE STITCHING

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bostitch, Inc., E. Greenwich, R. I.
Globe Manufacturing Co., Phila., Pa.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
International Staple & Machine Co., Clifton Heights, Pa.
Saranac Machine Co., Benton Harbor, Mich.

MACHINES, CASE UNLOADING

Ferguson, J. L., Co., Joliet, Ill.
Horix Mfg. Co., Pittsburgh, Pa.
Standard-Knapp Corp., Portland, Conn.

MACHINES, CELLULOSE TUBE MAKING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Hulbert Engineering Corp., Watertown, Wis.
Knowlton, M. D., Co., Rochester, N. Y.
Potdevin Machine Co., Bklyn, N. Y.
Simplex Wrapping Machine Co., Oakland, Calif.
Stokes & Smith Co., Phila., Pa.

MACHINES, COATING
(Lacquer and Varnish)

Champlain Co., Inc., New York, N. Y.
Du Pont de Nemours, E. I., & Co., Inc., Wilmington, Del.
Haida Engineering Co., Long Island City, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Infra-Red Engineers & Designers, Cleveland, Ohio
Kidder Press Co., Inc., Dover, N. H.
Knowlton, M. D., Co., Rochester, N. Y.
Marconetti, A. E., Inc., New York, N. Y.
Norwood Engineering Co., Florence, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Corp., E. Boston, Mass.
Rutherford Machinery Co., Div. General Printing Ink Corp., New York, N. Y.
Waldron, John, Corp., New Brunswick, N. J.

MACHINES, COATING
(Wax and Hot Melt)

Aeroil Burner Co., Inc., W. New York, N. J.
Container Equipment Corp., Newark, N. J.
Gellman Mfg. Co., Rock Island, Ill.
Haida Engineering Co., Long Island City, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
International Paper Box Machine Co., The, Nashua, N. H.
Knowlton, M. D., Co., Rochester, N. Y.
Norwood Engineering Co., The, Florence, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Richard Machine Co., Battle Creek, Mich.
Rotogravure Engineering Co., E. Boston, Mass.
Standard-Knapp Corp., Portland, Conn.
Waldron, John, Corp., New Brunswick, N. J.

MACHINES, COLLAPSIBLE TUBE FILLING & SEALING

Arenco Machine Co., Inc., New York, N. Y.
Colton, Arthur, Co., Detroit, Mich.
Kiefer, Karl, Machine Co., The, Cincinnati, Ohio
Stokes, F. J., Machine Co., Phila., Pa.

MACHINES, CORKING

Ermold, Edward, Co., New York, N. Y.
Horix Mfg. Co., Pittsburgh, Pa.
Kiefer, Karl, Machine Co., The, Cincinnati, Ohio
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Resina Automatic Machinery Co., Inc., Bklyn, N. Y.
U. S. Bottlers Machinery Co., Chicago, Ill.

MACHINES, COTTON INSERTING

Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Lakso Company, The, Fitchburg, Mass.
New Jersey Machine Corp., Hoboken, N. J.

MACHINES, COUNTING

Amsco Packaging Machinery Co., Long Island City, N. Y.
Ayers, John W., & Son, Bloomfield, N. J.

Addresses of companies listed appear on pages 945–955

XUM

Colton, Arthur, Co., Detroit, Mich.
Ferguson, J. L., Co., Joliet, Ill.
Maxson Automatic Machinery Co., Westerly, R. I.
Palmer, Frank D., Inc., Chicago, Ill.
Redington, F. B., Co., Chicago, Ill.
Triangle Package Machinery Co., Chicago, Ill.
Veeder-Root, Inc., Hartford, Conn.

MACHINES, CRIMPING, COLLAPSIBLE TUBE

Arenco Machine Co., Inc., New York, N. Y.
Colton, Arthur, Co., Detroit, Mich.
Knowlton, M. D., Co., Rochester, N. Y.
Pack-Rite Machine Corp., Milwaukee, Wis.
Stokes, F. J., Machine Co., Phila., Pa.
Wrap-Ade Machine Co., Newark, N. J.

MACHINES, CRIMPING & SEALING

Ams, Max, Machine Co., Bridgeport, Conn.
Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Cleveland Crimping Press Co., Cleveland, Ohio
Cleveland Lathe & Machine Co., Cleveland, Ohio
Gump, B. F., Co., Chicago, Ill.
Heat Seal-It Co., Phila., Pa.
Ivers-Lee Co., Newark, N. J.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Package Machinery Co., Springfield, Mass.
Pack-Rite Machines, Milwaukee, Wis.
Potdevin Machine Co., Bklyn, N. Y.
Sav-Way Industries, Detroit, Mich.
Simplex Wrapping Machine Co., Oakland, Calif.
Stokes & Smith Co., Phila., Pa.
Stokes, F. J., Machine Co., Phila., Pa.
Waldron, John, Corp., New Brunswick, N. J.
Wells Mfg. Co., San Francisco, Calif.
Wrap-Ade Machine Co., Newark, N. J.

MACHINES, CRIMPING, SEAMING FIBRE CANS

Ams, Max, Machine Co., Bridgeport, Conn.
Knowlton, M. D., Co., Rochester, N. Y.
Paslode Co., Chicago, Ill.

MACHINES, DIE CUTTING

Ayers, John W., & Son, Bloomfield, N. J.
Champlain Co., Inc., New York, N. Y.
Globe Mfg., Phila., Pa.
Goat, Fred, Co., Inc., The, Bklyn, N. Y.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Hulbert Engineering Corp., Watertown, Wis.
Lansky Die Cutting Co., New York, N. Y.
Palmer, Frank D., Inc., Chicago, Ill.
Parry, Samuel R., Machine Co., Rochester, N. Y.
Potdevin Machine Co., Bklyn, N. Y.
Smith & Winchester Mfg. Co., The, S. Windham, Conn.
Staude, E. G., Mfg. Co., St. Paul, Minn.

MACHINES, DOMING
(Boxes)

Beck, Charles, Machine Co., Phila., Pa.
Globe Mfg. Co., Phila., Pa.
Hulbert Engineering Corp., Watertown, Wis.
Knowlton, M. D., Co., Rochester, N. Y.
New Jersey Machine Corp., Hoboken, N. J.

MACHINES, EMBOSSING

Coughlin Manufacturing Co., New York, N. Y.
Force, Wm. A., & Co., Inc., Bklyn, N. Y.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Hudson-Sharp Machine Co., Green Bay, Wis.
Knowlton, M. D., Co., Rochester, N. Y.
Marconetti, A. E., Inc., New York, N. Y.
Markem Machine Co., Keene, N. H.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Norwood Engineering Co., Florence, Mass.
Paper Converting Machine Co., Green Bay, Wis.
Peerless Roll Leaf Co., Inc., Union City, N. J.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., E. Boston, Mass.
Rutherford Machinery Co., Div. of General Printing Ink Corp., New York, N. Y.
Waldron, John, Corp., New Brunswick, N. J.

MACHINES, FIBRE CAN MAKING

Ferguson, J. L., Co., Joliet, Ill.
Hudson-Sharp Machine Co., Green Bay, Wis.
Hulbert Engineering Corp., Watertown, Wis.
Knowlton, M. D., Co., Rochester, N. Y.
Langston, Samuel M., Co., Camden, N. J.
Package Machinery Co., Springfield, Mass.

MACHINES, FILLING, DRY
(Gross and Net Weight)

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Automatic Scale Co., Inc., New York, N. Y.
Bagpak, Inc., New York, N. Y.
Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Ferguson, J. L., Co., Joliet, Ill.
Goat, Fred, Co., Inc., The, Bklyn, N. Y.
Gump, B. F., Co., Chicago, Ill.
Palmer, Frank D., Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Richard Machine Co., Battle Creek, Mich.
St. Regis Paper Co., New York, N. Y.
Stokes, F. J., Machine Co., Phila., Pa.
Stokes & Smith Co., Phila., Pa.
Syntron Co., Homer City, Pa.
Toledo Scale Co., Toledo, Ohio
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Weigh Right Automatic Scale Co., Joliet, Ill.

MACHINES, FILLING, DRY
(Volumetric)

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Automatic Scale Co., Inc., New York, N. Y.
Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Ferguson, J. L., Co., Joliet, Ill.
Goat, Fred, Co., Inc., The, Bklyn, N. Y.
Ivers-Lee Co., Newark, N. J.
Jeffrey Mfg. Co., The, Columbus, Ohio
Mojonnier Bros. Co., Chicago, Ill.
Palmer, Frank D., Inc., Chicago, Ill.
Peerless Products Mfg. Co., Detroit, Mich.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Stokes, F. J., Machine Co., Phila., Pa.
Stokes & Smith Co., Phila., Pa.
Syntron Co., Homer City, Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Weigh Right Automatic Scale Co., Joliet, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, FILLING, LIQUID

Alsop Engineering Corp., Milldale, Conn.
Arenco Machine Co., Inc., New York, N. Y.
Colton, Arthur, Co., Detroit, Mich.
Crown Cork & Seal Co., Baltimore, Md.
Elgin Mfg. Co., Elgin, Ill.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Horix Manufacturing Co., Pittsburgh, Pa.
Kiefer, Karl, Machine Co., The, Cincinnati, Ohio
Liquid Carbonic Corp., The, Chicago, Ill.
Mojonnier Bros. Co., Chicago, Ill.
Palmer, Frank D., Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Scientific Filter Co., New York, N. Y.
Stokes, F. J., Machine Co., Phila., Pa.
U. S. Bottlers Machinery Co., Chicago, Ill.
Vol-U-Meter Co., The, Buffalo, N. Y.

MACHINES, FILLING, SEMI-LIQUID
(Viscose)

Arenco Machine Co., Inc., New York, N. Y.
Colton, Arthur, Co., Detroit, Mich.
Crown Can Co., Phila., Pa.
Elgin Mfg. Co., New York, N. Y.
Ferguson, J. L., Co., Joliet, Ill.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Horix Mfg. Co., Pittsburgh, Pa.
Kiefer, Karl, Machine Co., The, Cincinnati, Ohio
Mojonnier Bros. Co., Chicago, Ill.
Palmer, Frank D., Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Scientific Filter Co., New York, N. Y.
Stokes, F. J., Machine Co., Phila., Pa.
Stokes & Smith Co., Phila., Pa.
U. S. Bottlers Machinery Co., Chicago, Ill.
Vol-U-Meter Co., The, Buffalo, N. Y.

MACHINES, GUMMED TAPE

Better Packages, Inc., Shelton, Conn.
Bradner Smith & Co., Chicago, Ill.
Ever Ready Label Corp., New York, N. Y.
Glue Fast Equipment Co., Inc., New York, N. Y.
Gummed Tape & Devices Co., Bklyn, N. Y.
Haida Engineering Co., Long Island City, N. Y.
Knowlton, M. D., Co., Rochester, N. Y.
Nashua Package Sealing Co., Inc., Nashua, N. H.
Potdevin Machine Co., Bklyn, N. Y.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.

MACHINES, HEAT SEALING

American Machine & Foundry Co., New York, N. Y.
Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Cleveland Lathe & Machine Co., Cleveland, Ohio
Dennison Mfg. Co., Framingham, Mass.
Gump, B. F., Co., Chicago, Ill.
Hayssen Mfg. Co., Sheboygan, Wis.
Heat Seal-It Co., Phila., Pa.
Infra-Red Engineers & Designers, Cleveland, Ohio
Interstate Folding Box Co., Middletown, Ohio

Ivers-Lee Co., Newark, N. J.
M & R Mfg. Co., Mansfield, Ohio
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Oliver Machinery Co., Grand Rapids, Mich.
Package Machinery Co., Springfield, Mass.
Pack-Rite Machines, Milwaukee, Wis.
Palmer, Frank D., Inc., Chicago, Ill.
Redington, F. B., Co., Chicago, Ill.
Sav-Way Industries, Detroit, Mich.
Stokes & Smith Co., Phila., Pa.
Vertex Co., New York, N. Y.
Wrap-Ade Machine Co., Newark, N. J.

MACHINES, HOODING

Aluminum Co. of America, Pittsburgh, Pa.
Aluminum Seal Co., New Kensington, Pa.
Crown Cork & Seal Co., The, Baltimore, Md.
Package Machinery Co., Springfield, Mass.
Sealright Co., Inc., The, Fulton, N. Y.

MACHINES, LABEL GUMMING

Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Globe Manufacturing Co., Phila., Pa.
Glue Fast Equipment Co., Inc., New York, N. Y.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Knowlton, M. D., Rochester, N. Y.
New Jersey Machine Corp., Hoboken, N. J.
Parry, Samuel R., Machine Co., Rochester, N. Y.
Potdevin Machine Co., Bklyn, N. Y.
Stokes & Smith Co., Phila., Pa.
U. S. Bottlers Machinery Co., Chicago, Ill.
Waldron, John, Corp., New Brunswick, N. J.

MACHINES, LABELERS

Alsop Engineering Corp., Milldale, Conn.
Arenco Machine Co., Inc., New York, N. Y.
Better Packages, Inc., Shelton, Conn.
Burt Machine Co., Baltimore, Md.
Chisholm-Ryder Co., Inc., New Way Div., Hanover, Pa.
Economic Machinery Co., Worcester, Mass.
Ermold, Edward Co., New York, N. Y.
Ever Ready Label Corp., New York, N. Y.
Ferguson, J. L., Co., Joliet, Ill.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Gellman Mfg. Co., Rock Island, Ill.
Globe Mfg. Co., Phila., Pa.
Glue Fast Equipment Co., Inc., New York, N. Y.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Gummed Tape & Devices Co., Bklyn, N. Y.
Knowlton, M. D., Rochester, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
New Jersey Machine Corp., Hoboken, N. J.
Oliver Machinery Co., Pkg. Div., Grand Rapids, Mich.
Package Machinery Co., Springfield, Mass.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Redington, F. B., Co., Chicago, Ill.
Scientific Filter Co., New York, N. Y
Standard-Knapp Corp., Portland, Conn.
Stokes & Smith Co., Phila., Pa.
Vac-Spray Machine Co., Minneapolis, Minn.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, LABELING ATTACHMENTS

American Machine & Foundry Co., New York, N. Y.
Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Economic Machinery Co., Worcester, Mass.
Glue Fast Equipment Co., Inc., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
New Jersey Machine Corp., Hoboken, N. J.
Oliver Machinery Co., Pkg. Div., Grand Rapids, Mich.
Package Machinery Co., Springfield, Mass.
Palmer, Frank D., Inc., Chicago, Ill.
Redington, F. B., Co., Chicago, Ill.
Simplex Wrapping Machine Co., Oakland, Calif.
Standard-Knapp Corp., Portland, Conn.

MACHINES, LAMINATING

Champlain Co., Inc., New York, N. Y.
Haida Engineering Co., Long Island City, N. Y.
Henschel, C. B., Mfg. Co., Milwaukee, Wis.
Hudson-Sharp Machine Co., Green Bay, Wis.
Knowlton, M. D., Co., Rochester, N. Y.
Marconetti, A. E., Inc., New York, N. Y.
Meisel Press Mfg. Co., Boston, Mass.
Norwood Engineering Co., The, Florence, Mass.
Parry, Samuel R., Machine Co., Rochester, N. Y.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Corp., E. Boston, Mass.
Waldron, John, Corp., New Brunswick, N. J.

MACHINES, MARKING
(Box & Carton)

Ferguson, J. L., Co., Joliet, Ill.
Floquil Products, Inc., New York, N. Y.
Force, Wm. A., & Co., Inc., Bklyn, N. Y.
Gottscho, Adolph, Inc., New York, N. Y.
Markem Machine Co., Keene, N. H.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Melind, Louis, Chicago, Ill.
Palmer, Frank D., Inc., Chicago, Ill.
Peerless Roll Leaf Co., Inc., Union City, N. J.
Standard-Knapp Corp., Portland, Conn.
Superior Type Co., The, Chicago, Ill.
Vertex Co., New York, N. Y.

MACHINES, METAL EDGE STAYING

National Metal Edge Box Co., Phila., Pa.

MACHINES, NUMBERING, PRINTING OR PERFORATING

American Perforator Co., The, Chicago, Ill.
Bates Mfg. Co., The, New York, N. Y.
Champlain Co., Inc., New York, N. Y.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Ferguson, J. L., Co., Joliet, Ill.
Force, Wm. A., & Co., Inc., Bklyn, N. Y.
Gottscho, Adolph, Inc., New York, N. Y.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Markem Machine Co., Keene, N. H.
Meisel Press Mfg. Co., Boston, Mass.
Melind, Louis, Chicago, Ill.
New Jersey Machine Corp., Hoboken, N. J.
Oliver Machinery Co., Grand Rapids, Mich.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., East Boston, Mass.
Standard-Knapp Corp., Portland, Conn.

MACHINES, PACKET FILLING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Automatic Scale Co., Inc., New York, N. Y.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Ferguson, J. L., Co., Joliet, Ill.
Gump, B. F., Co., Chicago, Ill.
Hulbert Engineering Corp., Watertown, Wis.
Redington, F. B., Co., Chicago, Ill.
Richard Machine Co., Battle Creek, Mich.
Stokes & Smith, Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Weigh Right Automatic Scale Co., Joliet, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, PAPER BAG FEEDING, OPENING, WEIGHING & CLOSING
(Automatic)

Amsco Packaging Machinery Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Consolidated Packaging Machinery Co., Buffalo, N. Y.
Gump, B. F., Co., Chicago, Ill.
Palmer, Frank D., Inc., Chicago, Ill.
Potdevin Machine Co., Bklyn, N. Y.
Redington, F. B., Co., Chicago, Ill.
Stokes & Smith Co., Phila., Pa.
St. Regis Paper Co., New York, N. Y.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Weber, H. G., & Co., Inc., Kiel, Wis.
Weigh Right Automatic Scale Co., Joliet, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, PAPER ROLL FEEDING

Cameron Machine Co., Brooklyn, N. Y.
Champlain Co., Inc., New York, N. Y.
Hayssen Mfg. Co., Sheboygan, Wis.
Hudson-Sharp Machine Co., Green Bay, Wis.
Knowlton, M. D., Co., Rochester, N. Y.
Marconetti, A. E., Inc., New York, N. Y.
Modern Equipment Corp., Defiance, Ohio
Package Machinery Co., Springfield, Mass.
Palmer, Frank D., Inc., Chicago, Ill.
Paper Converting Machine Co., Green Bay, Wis.
Rotogravure Engineering Co., E. Boston, Mass.
Smith & Winchester Mfg. Co., The, S. Windham, Conn.
Waldron, John, Corp., New Brunswick, N. J.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, PAPER SHREDDING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Industrial Shredder & Cutter Co., Salem, Ohio
Norwood Engineering Co., Florence, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Stokes, F. J., Machine Co., Phila., Pa.
Waldron, John, Corp., New Brunswick, N. J.

MACHINES, PARTITION ASSEMBLING

Hooper, F. X., Co., Inc., Glenarm, Md.
Inman Mfg. Co., Inc., Amsterdam, N. Y.
Standard-Knapp Corp., Portland, Conn.

Addresses of companies listed appear on pages 945–955

MACHINES, PREFORMING & TABLETTING

Colton, Arthur, Co., Detroit, Mich.
Stokes, F. J., Machine Co., Phila., Pa.

MACHINES, REVENUE STAMP

American Machine & Foundry Co., New York, N. Y.
American Perforator Co., The, Chicago, Ill.
Arenco Machine Co., Inc., New York, N. Y.
New Jersey Machine Corp., Hoboken, N. J.
Package Machinery Co., Springfield, Mass.
Potdevin Machinery Co., Bklyn, N. Y.
Redington, F. B., Co., Chicago, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, RIGID TRANSPARENT FABRICATING
(All Types)

Able Machine & Tool Works, New York, N. Y.
Globe Mfg. Co., Phila., Pa.
Hulbert Engineering Corp., Watertown, Wis.
Knowlton, M. D., Co., Rochester, N. Y.
Smithe, F. L., Mach. Co., New York, N. Y.
Stokes & Smith Co., Phila., Pa.
Taber Instrument Corp., N. Tonawanda, N. Y.

MACHINES, ROLL LEAF STAMPING

Coughlin Mfg. Co., New York, N. Y.
Griffin, Campbell, Hayes, Walsh, Inc., New York, N. Y.
Markem Machine Co., Keene, N. H.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Peerless Roll Leaf Co., Inc., Union City, N. J.

MACHINES, ROLL SLITTERS & REWINDERS

Beck, Chas., Machine Co., Phila. Pa.
Cameron Machine Co., Bklyn, N. Y.
Champlain Co., Inc., New York, N. Y.
Globe Mfg. Co., Phila., Pa.
Hudson-Sharp Machine Co., Green Bay, Wis.
Kidder Press Co., Inc., Dover, N. H.
Knowlton, M. D., Co., Rochester, N. Y.
Langston, Samuel M., Co., Camden, N. J.
Marconetti, A. E., Inc., New York, N. Y.
Meisel Press Mfg. Co., Boston, Mass.
Norwood Engineering Co., Florence, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Corp., E. Boston, Mass.
Waldron, John, Corp., New Brunswick, N. J.

MACHINES, SHEET FEEDING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Marconetti, A. E., Inc., New York, N. Y.
New Jersey Machine Corp., Hoboken, N. J.
Package Machinery Co., Springfield, Mass.
Wright's Automatic Machinery Co., Durham, N. C.

MACHINES, SHEETING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Beck, Chas., Machine Co., Phila., Pa.
Champlain Co., Inc., New York, N. Y.
Globe Mfg. Co., Phila., Pa.
Hudson-Sharp Machine Co., Green Bay, Wis.
Kidder Press Co., Inc., Dover, N. H.
Knowlton, M. D., Co., Rochester, N. Y.
Maxson Automatic Machinery Co., Westerly, R. I.
Meisel Press Mfg. Co., Boston, Mass.
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Oliver Machinery Co., Pkg. Div., Grand Rapids, Mich.
Parry, Samuel R., Machine Co., Rochester, N. Y.
Peters Machinery Co., Chicago, Ill.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., E. Boston, Mass.
Smith & Winchester Mfg. Co., S. Windham, Conn.
Wrap-Ade Machine Co., Inc., Newark, N. J.

MACHINES, SPIRAL WRAPPING

Ferguson, J. L., Co., Joliet, Ill.
Knowlton, M. D., Co., Rochester, N. Y.
Langston, Samuel A., Co., Camden, N. J.
Paper Converting Machine Co., Green Bay, Wis.
Terkelsen Machine Co., Boston, Mass.
Vertex Co., New York, N. Y.

MACHINES, SPOUT INSERTING

Seal-Spout Corp., Newark, N. J.

MACHINES, STACKING

Jeffrey Manufacturing Co., The, Columbus, Ohio
Rapids-Standard Co., Inc., The, Grand Rapids, Mich.

MACHINES, STAPLING

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bostitch, Inc., E. Greenwich, R. I.
Globe Manufacturing Co., Phila., Pa.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
International Staple & Machine Co., Clifton Heights, Pa.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Paslode Co., Chicago, Ill.
Saranac Machine Co., Benton Harbor, Mich.
Seymour & Peck Co., Chicago, Ill.

MACHINES, STATIC ELIMINATING

Kidder Press Co., Inc., Dover, N. H.
Maxson Automatic Machinery Co., Westerly, R. I.
Potdevin Machine Co., Bklyn, N. Y.
Simco Co., The, Phila., Pa.

MACHINES, STENCIL CUTTING

Bradley, A. J., Mfg. Co., Long Island City, N. Y.
Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Ideal Stencil Machine Co., Racine, Wis.
Knowlton, M. D., Co., Rochester, N. Y.
Marsh Stencil Machine Co., Belleville, Ill.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Noble & Westbrook Mfg. Co., The, E. Hartford, Conn.

MACHINES, STRIP COMBINING
(For Window Bags & Wrappers)

Cameron Machine Co., Bklyn, N. Y.
Potdevin Machine Co., Bklyn, N. Y.

MACHINES, TABLET COUNTING & PACKAGING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Ayers, John W., & Son, Bloomfield, N. J.
Colton, Arthur, Co., Detroit, Mich.
Hulbert Engineering Corp., Watertown, Wis.
Ivers-Lee Co., Newark, N. J.
Palmer, Frank D., Inc., Chicago, Ill.
Redington, F. B., Co., Chicago, Ill.
Stokes, F. J., Machine Co., Phila, Pa.
Stokes & Smith Co., Phila., Pa.
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.

MACHINES, TAPE DISPENSERS

Better Packages, Inc., Shelton, Conn.
Chicago Gum Tape Co., Chicago, Ill.
Gummed Tape & Devices Co., Bklyn, N. Y.
Nashua Package Sealing Co., Nashua, N. H.

MACHINES, TAPE SEALING

Better Packages, Inc., Shelton, Conn.
Bradner Smith & Co., Chicago, Ill.
Chicago Gum Tape Co., Chicago, Ill.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Ever Ready Label Corp., New York, N. Y.
Gummed Tape & Devices Co., Bklyn, N. Y.
Package Machinery Co., Springfield, Mass.
Vertex Co., New York, N. Y.

MACHINES, TEA BAG

Pneumatic Scale Corp., Ltd., N. Quincy, Mass.

MACHINES, TIGHT WRAPPING
(For Carton Shells)

Pneumatic Scale Corp., Ltd., N. Quincy, Mass.
Scandia Mfg. Co., N. Arlington, N. J.
Stokes & Smith Co., Phila., Pa.

MACHINES, TUBE LACQUERING, VARNISHING & PRINTING

Hudson-Sharp Machine Co., Green Bay, Wis.
Markem Machine Co., Keene, N. H.
Rutherford Machinery Co. Div., Gen Printing Ink Corp., New York, N. Y.
Waldron, John, Corp., New Brunswick, N. J.

MACHINES, TYING

Bunn, B. H., Co., Chicago, Ill.
Globe Mfg. Co., Phila., Pa.
Potdevin Machine Co., Bklyn, N. Y.
Vertex Co., New York, N. Y.

MACHINES, UNSCRAMBLING

Burt Machine Co., Baltimore, Md.
Chisholm-Ryder Co., Inc., New Way Div., Hanover, Pa.
Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Horix Mfg. Co., Pittsburgh, Pa.
Island Equipment Corp., New York, N. Y.
New Jersey Machine Corp., Hoboken, N. J.
Palmer, Frank D., Inc., Chicago, Ill.
Standard-Knapp Corp., Portland, Conn.

MACHINES, VIBRATORS
(For Packing & Settling)

Gump, B. F., Co., Chicago, Ill.
Jeffrey Mfg. Co., The, Columbus, Ohio

Palmer, Frank D., Inc., Chicago, Ill.
Stokes & Smith, Phila., Pa.
Syntron Co., Homer City, Pa.

MACHINES, WINDING

Cameron Machine Co., Bklyn, N. Y.
Knowlton, M. D., Co., Rochester, N. Y.
Paper Converting Machine Co., Green Bay, Wis.

MACHINES, WIRE STAPLING

Acme Staple Co., Camden, N. J.
Acme Steel Co., Chicago, Ill.
Bates Mfg. Co., The, New York, N. Y.
Bostitch, Inc., E. Greenwich, R. I.
Globe Mfg. Co., Phila., Pa.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
Ideal Stitcher & Mfg. Co., Racine, Wis.
International Staple & Machine Co., Clifton Heights, Pa.
Paslode Co., Chicago, Ill.
Saranac Machine Co., Benton Harbor, Mich.

MACHINES, WIRE STITCHING

Acme Steel Co., Chicago, Ill.
Bostitch, Inc., E. Greenwich, R. I.
Dexter Folder Co., New York, N. Y.
Globe Mfg. Co., Phila., Pa.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Heller Co., The, Cleveland, Ohio
Ideal Stitcher & Mfg. Co., Racine, Wis.
Knowlton, M. D., Co., Rochester, N. Y.
Paslode Co., Chicago, Ill.
Saranac Machine Co., Benton Harbor, Mich.

MACHINES, WRAPPING

American Machine & Foundry Co., New York, N. Y.
Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Burt Machine Co., Baltimore, Md.
Gellman Mfg. Co., Rock Island, Ill.
Globe Mfg. Co., Phila., Pa.
Hayssen Mfg. Co., Sheboygan, Wis.
Hudson-Sharp Machine Co., Green Bay, Wis.
Ivers-Lee Co., Newark, N. J.
Johnson Automatic Sealer Co. Ltd., Battle Creek, Mich.
Lynch Mfg. Corp., Defiance, Ohio
Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Modern Equipment Corp., Defiance, Ohio
National Bread Wrapping Machine Co., Springfield, Mass.
Oliver Machinery Co. Pkg. Div., Grand Rapids, Mich.
Maxson Automatic Machinery Co., Westerly, R. I.
Package Machinery Co., Springfield, Mass.
Pack-Rite Machines, Milwaukee, Wis.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Redington, F. B., Co., Chicago, Ill.
Richard Machine Co., Battle Creek, Mich.
Scandia Mfg. Co., N. Arlington, N. J.
Stokes & Smith Co., Phila., Pa.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Wright's Automatic Machinery Co., Durham, N. C.

MARKING EQUIPMENT

Chisholm-Ryder Co., Inc., New Way Div., Hanover, Pa.
Dennison Manufacturing Co., Framingham, Mass.
Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Ferguson, J. L., Co., Joliet, Ill.
Floquil Products, Inc., New York, N. Y.
Force, Wm. A., & Co., Inc., Bklyn, N. Y.
Gottscho, Adolph, Inc., New York, N. Y.
Markem, Machine Co., Keene, N. H.
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Melind, Louis, Chicago, Ill.
Peerless Roll Leaf Co., Inc., Union City, N. J.
Superior Type Co., The, Chicago, Ill.
Vertex Co., New York, N. Y.
Weber Addressing Machine Co., Chicago, Ill.

PRESSES, PRINTING
(Aniline)

Champlain Co., Inc., New York, N. Y.
Cottrell, C. B., & Sons Co., Claybourn Div., Milwaukee, Wis.
Haida Engineering Co., Long Island City, N. Y.
Heinrich, H. H., Inc., New York, N. Y.
Henschel, C. B., Mfg. Co., Milwaukee, Wis.
Hudson-Sharp Machine Co., Green Bay, Wis.
Kidder Press Co., Inc., Dover, N. H.
Marconetti, A. E., Inc., New York, N. Y.
Meisel Press Mfg. Co., Boston, Mass.
Norwood Engineering Co., Florence, Mass.
Paper Converting Machine Co., Green Bay, Wis.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., E. Boston, Mass.
Rutherford Machinery Co., New York, N. Y.
Staude, E. G., Mfg. Co., St. Paul, Minn.
Waldron, John, Corp., New Brunswick, N. J.

PRESSES, PRINTING
(Letterpress)

Champlain Co., Inc., New York, N. Y.
Cottrell, C. B., & Sons Co., Claybourn Div., Milwaukee, Wis.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Hooper, F. X., Co., Glenarm, Md.
Hudson-Sharp Machine Co., Green Bay, Wis.
Inman Mfg. Co., Inc., Amsterdam, N. Y.
Kidder Press Co., Inc., Dover, N. H.
Marconetti, A. E., Inc., New York, N. Y.
Markem Machine Co., Keene, N. H.
Meisel Press Mfg. Co., Boston, Mass.
Miehle Printing Press Mfg. Co., Chicago, Ill.
Miller Printing Machinery Co., Pittsburgh, Pa.
Paper Converting Machine Co., Green Bay, Wis.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., E. Boston, Mass.
Rutherford Machinery Co., Div. General Ptg. Ink Corp., New York, N. Y.
Staude, E. G., Mfg. Co., St. Paul, Minn.
Stokes & Smith Co., Phila., Pa.

PRESSES, PRINTING
(Lithographic)

Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Hoe, R., & Co., Inc., New York, N. Y.
Meisel Press Mfg. Co., Boston, Mass.
Miehle Printing Press Mfg. Co., Chicago, Ill.
Rutherford Machinery Co., New York, N. Y.
Webendorfer-Wills Co., Div. American Type Founders Sales Corp., Mt. Vernon, N. Y.

PRESSES, PRINTING
(Raised)

Meisel Press Mfg. Co., Boston, Mass.
Rotogravure Engineering Co., E. Boston, Mass.
Rutherford Machinery Co., New York, N. Y.
Waldron, John, Corp., New Brunswick, N. J.

PRESSES, PRINTING
(Rotogravure)

Champlain Co., Inc., New York, N. Y.
Cottrell, C. B., & Sons Co., Claybourn Div., Milwaukee, Wis.
Goss Printing Press Co., Chicago, Ill.
Harris-Seybold-Potter Co., Seybold Div., Dayton, Ohio
Hoe, R., & Co., New York, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Kidder Press Co., Inc., Dover, N. H.
Marconetti, A. E., Inc., New York, N. Y.
Meisel Press Mfg. Co., Boston, Mass.
Norwood Engineering Co., Florence, Mass.
Potdevin Machine Co., Bklyn, N. Y.
Rotogravure Engineering Co., E. Boston, Mass.
Staude, E. G., Mfg. Co., St. Paul, Minn.
Waldron, John, Corp., New Brunswick, N. J.

SCALES, AUTOMATIC CHECK WEIGHERS

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Arenco Machine Co., Inc., New York, N. Y.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Detecto Scales, Inc., Bklyn, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Goat, Fred, Co., Inc., The, Bklyn, N. Y.
Gump, B. F., Co., Chicago, Ill.
Howe Scale Co., The, Rutland, Vt.
Merrick Scale Mfg. Co., Passaic, N. J.
Palmer, Frank D., Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Stokes & Smith Co., Phila., Pa.
Toledo Scale Co., Toledo, Ohio
Triangle Package Machinery Co., Chicago, Ill.
Weigh Right Automatic Scale Co., Joliet, Ill.

SCALES, CONVEYOR

Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Howe Scale Co., The, Rutland, Vt.
Toledo Scale Co., Toledo, Ohio
Triangle Package Machinery Co., Chicago, Ill.
Weigh Right Automatic Scale Co., Joliet, Ill.

SCALES, FREIGHT, EXPRESS
(Computing)

Detecto Scales, Inc., Bklyn, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Howe Scale Co., The, Rutland, Vt.
Toledo Scale Co., Toledo, Ohio

Addresses of companies listed appear on pages 945–955

SCALES, OVER & UNDER WEIGHT

Arenco Machine Co., Inc., New York, N. Y.
Detecto Scales, Inc., Bklyn, N. Y.
Exact Weight Scale Co., The, Columbus, Ohio
Howe Scale Co., The, Rutland, Vt.
Merrick Scale Mfg. Co., Passaic, N. J.
Thwing-Albert Instrument Co., Phila., Pa.
Toledo Scale Co., Toledo, Ohio

SCALES, WEIGHING & FILLING

Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Exact Weight Scale Co., Columbus, Ohio
Ferguson, J. L., Co., Joliet, Ill.
Gump, B. F., Co., Chicago, Ill.
Howe Scale Co., The, Rutland, Vt.
Palmer, Frank D., Inc., Chicago, Ill.
Pneumatic Scale Corp., Ltd., North Quincy, Mass.
Stokes & Smith Co., Phila., Pa.
Toledo Scale Co., Toledo, Ohio
Triangle Package Machinery Co., Chicago, Ill.
U. S. Automatic Box Machinery Co., Inc., Boston, Mass.
Vol-U-Meter Co., The, Buffalo, N. Y.
Weigh Right Automatic Scale Co., Joliet, Ill.
Wright's Automatic Machinery Co., Durham, N. C.

SCALES, WEIGHT PRINTING

Howe Scale Co., The, Rutland, Vt.
Toledo Scale Co., Toledo, Ohio

SPRAYERS

Aeroil Burner Co., Inc., W. New York, N. J.
Bronzart Metals Co., New York, N. Y.
Federal Tool Corp., Chicago, Ill.
Glass Industries, Inc., New York, N. Y.
R. C. Can Co., St. Louis, Mo.
Scovill Mfg. Co., Waterbury, Conn.
Wilco Co., Los Angeles, Calif.

TANKS, HEATING & DIPPING

Aeroil Burner Co., W. New York, N. J.
Cooper, D. C.. Co., Chicago, Ill.
Heil Engineering Co., Cleveland, Ohio
Youngstown-Miller Co., Sandusky, Ohio

TESTING EQUIPMENT

Hart Moisture Gauges, Inc., New York, N. Y.
Taber Instrument Corp., N. Tonawanda, N. Y.
Thwing-Albert Instrument Co., Phila., Pa

Services Section

ASSOCIATIONS, TRADE & EDUCATIONAL
(Pertaining to Packaging)

Adhesives Manufacturers Assn. of America, New York, N. Y.
Advertising Federation of America, New York, N. Y.
Advertising Research Foundation, New York, N. Y.
American Assn. of Advertising Agencies, New York, N. Y.
American Drug Manufacturers Assn., Washington, D. C.
American Inst. of Food Distribution, New York, N. Y.
American Management Assn., New York, N. Y.
American Marketing Assn., Bloomington, Ind.
American Meat Inst., Chicago, Ill.
American Paper & Pulp Assn., New York, N. Y.
American Society for Testing Materials, Phila., Pa.
American Spice Trade Assn., New York, N.Y.
American Standards Assn., New York, N. Y.
American Veneer Package Assn., Washington, D. C.
American Waxed Paper Assn., Phila., Pa.
Associated Cooperage Industries of America, St. Louis, Mo.
Associated Grocery Manufacturers of America, New York, N. Y.
Assn. of Canadian Advertisers, Toronto, Canada
Assn. of Food Distributors, New York, N.Y.
Assn. of National Advertisers, New York, N. Y.
Bristol Board Manufacturers Group (APPA), New York, N. Y.
Can Manufacturers Inst., New York, N. Y.
Cardboard Manufacturers Assn., New York, N. Y.
Coated & Processed Paper Assn., Providence, R. I.
Collapsible Tube Manufacturers Assn., New York, N. Y.
Container Manufacturers Guild, New York, N. Y.
Cooperative Food Distributors of America, Washington, D. C.
Cork Inst. of America, New York, N. Y.
Crown Manufacturers Assn. of America, Washington, D. C.
Cup and Container Inst., New York, N. Y.
Envelope Manufacturers Assn. of America, New York, N. Y.
Fibre Box Assn., Chicago, Ill.
Flexible Packaging Inst., New York, N. Y.
Folding Paper Box Assn. of America, Chicago, Ill.
Folding Paper Box Manufacturers Assn., New York, N. Y.
Freight Claim Civ., Assn. of American Railroads, Chicago, Ill.
Frosted Foods Assn., New York, N. Y.
Frosted Foods Inst. of California, San Francisco, Calif.
Glass Container Assn. of America, New York, N. Y.
Glassine & Greaseproof Paper Manufacturers Assn., New York, N. Y.
Gummed Industries Assn., New York, N. Y.
Institute of Paper Chemistry, c/o Lawrence College, Appleton, Wis.
Kraft Paper Assn., New York, N. Y.
Label Manufacturers National Assn., Washington, D. C.
Lithographers National Assn., New York, N. Y.
Lithographic Technical Foundation, New York, N. Y.
Marking Device Assn., Chicago, Ill.
Milk Cap Statistical Bureau, Phila., Pa.
National Assn. of Bottle Cap Manufacturers (Now Milk Cap Statistical Bureau),
National Assn. of Display Industries, Chicago, Ill.
National Assn. of Food Chains, Washington, D. C.
National Assn. of Glue Manufacturers, New York, N. Y.
National Assn. of Manufacturers, New York, N. Y.
National Assn. of Printing Ink Makers, New York, N. Y.
National Assn. of Sanitary Milk Bottle Closure Manufacturers, Phila., Pa.
National Canners Assn., Washington, D. C.
National Confectioners Assn., Chicago, Ill.
National Consumer-Retailer Council, New York, N. Y.
National Dehydrators Assn., Chicago, Ill.
National Fibre Can & Tube Assn., New York, N. Y.
National Industrial Advertisers Assn., Chicago, Ill.
National Paint, Varnish & Lacquer Assn., Washington, D. C.
National Paper Box Manufacturers Assn., Phila., Pa.
National Paper Box Supplies Assn., Summit, N. J.
National Wholesale Druggists' Assn., New York, N. Y.
National Wooden Box Assn., Washington, D. C.
Packaging Institute, New York, N. Y.
Packaging Machinery Manufacturers Inst., New York, N. Y.
Paper & Bag Institute of the Pacific Coast, San Francisco, Calif.
Paper Bag Manufacturers Inst., New York, N. Y.
Paper Pail Assn., Chicago, Ill.
Paper Shipping Sack Manufacturers Assn., New York, N. Y.
Paraffined Carton Assn., Chicago, Ill.
Plastic Products Manufacturers Assn., New York, N. Y.
Plywood Package Inst., New York, N. Y.
Point of Purchase Advertising Inst., New York, N. Y.
Proprietary Assn., Washington, D. C.
Roll Leaf Manufacturers Assn., New York N. Y.
Society of Designers for Industry, New York, N. Y.
Society of the Plastics Industry, New York, N. Y.
Steel Package Manufacturers Inst., Cleveland, Ohio
Technical Assn. of the Pulp & Paper Industry, New York, N. Y.
Textile Bag Manufacturers Assn., Chicago, Ill.
Textile Color Card Assn., New York, N. Y.
Toilet Goods Assn., New York, N. Y.
Tri-State Packers Assn., Easton, Md.
Veneer Package Council, Washington, D. C.
Wirebound Box Manufacturers Assn., Chicago, Ill.

CUSTOM PACKAGERS

Gesell, R., Inc., New York, N. Y.
House of Price, New York, N. Y.
Ivers-Lee Co., Newark, N. J.
Jamieson, C. E., & Co., Detroit, Mich.
Peerless Packers, New York, N. Y.
Ray, Ellen, Laboratories, Bklyn, N. Y.
Stevens-Wiley Mfg. Co., Inc., The, Phila., Pa.
Strong Cobb & Co., Inc., Cleveland, Ohio
Trans-Pac Services, Inc., New York, N. Y.
Transparent Specialties Corp., Cleveland, Ohio
Vitapak Co., New York, N. Y.
Wilco Co., Los Angeles, Calif.

DISPLAY MOUNTING AND FINISHING

Arvey Corp., Jersey City, N. J.
Badger Carton Co., Milwaukee, Wis.
Bronzart Metals Co., New York, N. Y.

Bold-face listings indicate advertisers in this issue

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Chaspec Mfg. Co., New York, N. Y.
Chicago Cardboard Co., Chicago, Ill.
Cowles, Harold A., Box & Display Co., Rochester, N. Y.
Display Finishing Co., Inc., Long Island City, N. Y.
Fibreboard Products Inc., San Francisco, Calif.
Freedman, Wm. A., Die Cutters, New York, N. Y.
Fuller Displays, Inc., Long Island City, N. Y.
Lansky Die Cutting Co., New York, N. Y.
Lithographers' Finishing Co., Inc., New York, N. Y.
Merit Display Card Co., New York, N. Y.
Plastics Finishers Corp., Bklyn, N. Y.
Schmidt Litho. Co., San Francisco, Calif.
Schoettle, Edwin J., Co., Phila., Pa.
Transparent Specialties Corp., Cleveland, Ohio
U. S. Finishing & Mfg. Co., Chicago, Ill.
Warneke Paper Box Co., Denver, Colo.

EMBOSSING, CUSTOM

Anderson, A. J., Co., Chicago, Ill.
Buckley, C. E., Co., Leominster, Mass.
Central Lithograph Co., The, Cleveland, Ohio
Chaspec Mfg. Co., New York, N. Y.
Consolidated Lithographing Corp., Bklyn, N. Y.
Frann Paper Co., Bklyn, N. Y.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Lansky Die Cutting Co., New York, N. Y.
Lithographers Finishing Co., New York, N. Y.
Matthias Paper Corp., Phila., Pa.
Peerless Roll Leaf Co., Inc., Union City, N. J.
Sweetnam, George H., Inc., Cambridge, Mass.
Transparent Specialties Corp., Cleveland, Ohio
United Mfg. Co., Springfield, Mass.
Universal Jewelry Case Co., Chicopee, Mass.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Wiener Bros., Inc., New York, N. Y.

FINISHING & COATING, CUSTOM

(Lacquers & Varnishes)

Burt, F. M., Co., Inc., Buffalo, N. Y.
Chaspec Mfg. Co., New York, N. Y.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Dejonge, Louis, & Co., New York, N. Y.
Flood & Conklin Mfg. Co., Newark, N. J.
Kirby-Cogeshall-Steinau Co., Milwaukee, Wis.
Lithographers Finishing Co., New York, N. Y.
Lowery & Schwartz, New York, N. Y.
Matthias Paper Corp., Phila., Pa.
McCoy Paper Converters, Phila., Pa.
Mor-Gan Laminating & Foliating Co., New York, N. Y.
Paragon Plastics, Inc., Seattle, Wash.
Plas-Tex Engineering Corp., Paterson, N. J.
Pyrotex Leather Co., Leominster, Mass.
Riegel Paper Corp., New York, N. Y.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
U. S. Finishing & Mfg. Co., Chicago, Ill.
Wiener Bros., Inc., New York, N. Y.

FLOCKING

Art-Tex, New York, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
Chaspec Mfg. Co., New York, N. Y.
Matthias Paper Corp., Phila., Pa.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
Stensgaard, W. L., & Assocs., Inc., Chicago, Ill.

LABORATORIES, RESEARCH & TESTING, INDEPENDENT

Alexander, Jerome, New York, N. Y.
Analytical Laboratory, The, Jersey City, N. J.
Bowser-Morner Testing Laboratories, Dayton, Ohio
California Testing Laboratories, Los Angeles, Calif.
Columbus Laboratories, The, Chicago, Ill.
Container Testing Laboratories, Inc., New York, N. Y., Chicago, Ill., & San Francisco, Calif.
Detroit Testing Laboratory, The, Detroit, Mich.
Dumas Laboratory, The, Atlanta, Ga.
Laucks Laboratories, Inc., Seattle, Wash.
LaWall and Harrisson, Phila., Pa.
Levey, H. A., Labs., New Orleans, La.
Little, Arthur D., Inc., Cambridge, Mass.
Los Angeles Testing Laboratory, Los Angeles, Calif.
Maffitt, Howard C., Des Moines, Iowa
National Canners' Laboratory, Pittsburgh, Pa.
New York Testing Laboratories, New York, N. Y.
Northwest Testing Laboratories, Seattle, Wash.
Osborne, Raymond G., Laboratories, Los Angeles, Calif.
Package Materials Laboratories Co., Long Island City, N. Y.
Pitkin, Lucius, Inc., New York, N. Y.
Pittsburgh Testing Laboratory, Pittsburgh, Pa.
Quinn, Don L., Co., The, Chicago, Ill.
Smith-Emery Co., Los Angeles, Calif.; San Francisco, Calif.
Twining Laboratories, The, Fresno, Calif.
United States Testing Co., Inc., Hoboken, N. J.

LAMINATING, CUSTOM

American Coating Mills, Inc., Elkhart, Ind.
Arvey Corp., Jersey City, N. J.
Butterfield-Barry Co., New York, N. Y.
Capac Mfg. Co., Capac, Mich.
Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dobeckmun Co., The, Cleveland, Ohio
Dejonge, Louis, & Co., New York, N. Y.
Flood & Conklin Mfg. Co., Newark, N. J.
Fuller Displays, Inc., Long Island City, N. Y.
General Felt Products, Inc., Bklyn, N. Y.
General Laminating, Inc., New York, N. Y.
Interstate Folding Box Co., Middletown, O.
Irvington Varnish & Insulator Co., Irvington, N. J.
Jaypaco Co., New York, N. Y.
Laminating Corp., Chicago, Ill.
Laminoid, Inc., N. Bergen, N. J.
Matthias Paper Corp., Phila., Pa.
Marvellum Co., The, Holyoke, Mass.
McCoy Paper Converters, Phila., Pa.
McLaurin-Jones Co., Brookfield, Mass.
Meier, Joshua, Co., New York, N. Y.
Miller Paper Co., New York, N. Y.
Milprint, Inc., Milwaukee, Wis.
Mor-Gan Laminating & Foliating Co., New York, N. Y.
Nashua Gummed & Coated Paper Co., Nashua, N. H.
National Water-Proofing Co., Camden, N. J.
New York Laminating Co., Irvington, N. J.
Paragon Plastics, Inc., Seattle, Wash.
Parry, Samuel R., Machine Co., Rochester, N. Y.
Plastics Finishing Corp., Bklyn, N. Y.
Plas-Tex Engineering Corp., Paterson, N. J.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Rexford Paper Co., Milwaukee, Wis.
Reynolds Metals Co., Richmond, Va.
Riegel Paper Corp., New York, N. Y.
Salwen, Joe, Paper Co., New York, N. Y.
Shellmar Products Co., Mt. Vernon, Ohio
Shoup-Owens, Inc., Hoboken, N. J.
Sweetnam, Geo. H., Inc., Cambridge, Mass.
Traver Corp., Chicago, Ill.
Twitchell, E. W., Inc., Packaging Div., Phila., Pa.
U. S. Finishing & Mfg. Co., Chicago, Ill.
United Mfg. Co., Springfield, Mass.
Walser Mfg. Co., The, Clifton, N. J.
Westfield River Paper Co., Inc., Russell, Mass.

LITHOGRAPHERS

Addison Lithographing Co., Rochester, N. Y.
Advertising Metal Display Co., Chicago, Ill.
Arvey Corp., Jersey City, N. J.
Bones & Mayer, Phila., Pa.
Brandau-Craig-Dickerson Co., Nashville, Tenn.
Brooks & Porter, Inc., New York, N. Y.
Brooks Bank Note Co., Springfield, Mass.
Burt, F. N., Co., Inc., Buffalo, N. Y.
Calvert Lithographing Co., Detroit, Mich.
Central Lithograph Co., Cleveland, Ohio
Consolidated Lithographing Corp., Bklyn, N. Y.
Continental Lithograph Corp., Cleveland, O.
Courier Journal Job Printing Co., Louisville, Ky.
Crocker Union, San Francisco, Calif.
Edwards & Deutsch Lithographing Co., Chicago, Ill.
Einson-Freeman Co., Inc., Long Island City, N. Y.
Empire Lithographing Co., Inc., New York, N. Y.
Eureka Specialty Printing Co., Scranton, Pa.
Fairchild, E. E., Corp., Rochester, N. Y.
Fitzhugh, Wm. W., Inc., Bklyn, N. Y.
Fleming-Potter Co., Peoria, Ill.
Forbes Lithograph Mfg. Co., Boston, Mass.
Fuller Displays, Inc., Long Island City, N. Y.
Gamse Lithographing Co., Inc., Baltimore, Md.
General Felt Products, Inc., Bklyn, N. Y.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Howell, F. M., & Co., Grand Rapids, Mich.
Inland Lithograph Co., Chicago, Ill.
Kaumagraph Co., Wilmington, Del.
Ketterlinus Lithographic Mfg. Co., Phila., Pa.
Kindred, MacLean & Co., Inc., Long Island City, N. Y.
Lebanon Paper Box Co., Lebanon, Pa.
Lehman Printing & Litho. Co., San Francisco, Calif.
Lord Baltimore Press, New York, N. Y.
Magill-Weinsheimer Co., Chicago, Ill.
Mandus Co., Inc., New York, N. Y.
McCandish Lithograph Corp., Phila., Pa.
Michigan Litho. Co., Grand Rapids, Mich.
Milprint, Inc., Milwaukee, Wis.
Nalco Inc., New York, N. Y.
National Color Printing Co., Inc., The, Baltimore, Md.
National Printing & Engraving Co., Chicago, Ill.
National Process Co., New York, N. Y.
Niagara Lithograph Co., Buffalo, N. Y.
Oberly & Newell Lithograph Corp., New York, N. Y.
Penn Lithographing Co., Phila., Pa.
Philipp Lithographing Co., Milwaukee, Wis.
Pictorial Paper Package Corp., Aurora, Ill.
Progress Lithographing Co., The, Reading, Ohio
Rainbow Lithographing Co., The, Cincinnati, Ohio
Reynolds Metals Co., Richmond, Va.
Rode & Brand, New York, N. Y.
Roesch, Louis, Co., San Francisco, Calif.
Roman, Martin L., Co., The, New York, N. Y.

Rossotti Lithographing Co., N. Bergen, N. J.
Roto-Lith, Ltd., New York, N. Y.
St. Louis Lithographing Co., St. Louis, Mo.
Schmidt Lithograph Co., San Francisco, Calif.
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sterling Offset Co., New York, N. Y.
Strobridge Lithographing Co., The, Cincinnati, Ohio
Sutherland Paper Co., Kalamazoo, Mich.
Talmadge Printing Co., New York, N. Y.
Trade Lithograph & Printing Co., Inc., New York, N. Y.
Trautmann, Bailey & Blampey, New York, N. Y.
United States Printing & Lithograph Co., The, Cincinnati, Ohio
Waddill Printing & Lithographing Co., Danville, Va.
Wilmanns Bros. Co., Milwaukee, Wis.
Zipprodt, Inc., Chicago, Ill.

MOLDERS, PLASTIC

Ability Mold & Die Works, Chicago, Ill.
Accessories Mfg. Co., Kansas City, Mo.
Accurate Molding Corp., Bklyn, N. Y.
Ackerman Plastic Molding, Cleveland, Ohio
Acraglas Co., The, Santa Monica, Calif.
Adler Engineering Co., Hackettstown, N. J.
Advance Molding Corp., New York, N. Y.
Alden Prods. Co., Brockton, Mass.
All American Aircraft Prods., Inc., Long Beach, Calif.
Allied Barrel Corp., Oil City, Pa.
Allied Plastics Co., Los Angeles, Calif.
American Denture Corp., Portland, Ore.
American Insulator Corp., New Freedom, Pa.
American Molded Products Co., Chicago, Ill.
American Molding Co., San Francisco, Calif.
Amos-Thompson Corp., Edinburgh, Ind.
Armstrong Cork Co., Lancaster, Pa.
Arpin Prods., Inc., Orange, N. J.
Arrow Plastics Corp., Passaic, N. J.
Artisan Plastic Moulding Co., Trenton, N. J.
Atlantic Plastic & Metal Parts Co., Cleveland, Ohio
Atlantic Plastics, Inc., Woodside, N. Y.
Atlas Appliance Corp., Bklyn, N. Y.
Atlas Plastic Mfg. Co., Inc., Lynbrook, L. I., N. Y.
Auburn Button Works, Inc., Auburn, N. Y.
Automatic Plastic Prods., Emeryville, Calif.
Bachmann Bros., Inc., Phila., Pa.
Baker, Willoughby, Oakland, Calif.
Barber Colman Co., Molded Prods. Div., Rockford, Ill.
Barnes Plastic Co., Los Angeles, Calif.
Bay State Moulding Co., Boston, Mass.
Beaman Molded Prods. Co., Portland, Ore.
Bergwood Molding Co., Kansas City, Mo.
Berkander, Geo. F., Inc., Providence, R. I.
Bolta Co., The, Lawrence, Mass.
Boonton Molding Co., Boonton, N. J.
Breyer Molding Co., Chicago, Ill.
Bridgeport Moulded Prods., Inc., Bridgeport, Conn.
Brill-Monfort Co., Inc., Bklyn, N. Y.
Brogan, Byard F., Phila., Pa.
Bryant Electric Co., Bridgeport, Conn.
Burton Mfg. Co., Chicago, Ill.
Butterfield, T. F., Inc., Naugatuck, Conn.
Button Corp. of America, Newark, N. J.
Caldwell Prods., Inc., New York, N. Y.
California Pacific Plastic Co., Los Angeles, Calif.
California Plastic Moulding Co., Los Angeles, Calif.
California Plastics Co., San Francisco, Calif.
Capac Mfg. Co., Capac, Mich.
Cardinal Corp., The, Evansville, Ind.
Celluplastic Corp., Newark, N. J.
Central Die Casting & Mfg. Co., Chicago, Ill.
Central Machine Works Co., Minneapolis, Minn.
Chicago Die Mold Mfg. Co., Chicago, Ill.
Chicago Molded Products Corp., Chicago, Ill.
Chicago Plastic Mfg. Co., Chicago, Ill.
Cinch Mfg. Corp., Chicago, Ill.
Cincinnati Advertising Prods. Co., Cincinnati, Ohio
Cincinnati Molding Co., Cincinnati, Ohio
Claremould Plastics Co., Newark, N. J.
Cleveland Plastics, Inc., Cleveland, Ohio
Climax Mfg. & Molding Corp., Canton, Ohio
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Protektosite Co., Inc., Carlstadt, N. J.
Columbus Plastic Products Co., Inc., Columbus, Ohio
Commonwealth Plastic Co., Leominster, Mass.
Compo-Site, Plastics Div., E. S. Lowe Co., Inc., Paterson, N. J.
Connecticut Hard Rubber Co., New Haven, Conn.
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Adamant	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Addoweight	Automatic indicating, totalizing and counting scale	Merrick Scale Mfg. Co., Passaic, N. J.
Ad-Here	Decalcomania for jars and bottles	Palm Bros. Decalcomania Co., The, Cincinnati, O.
Aeromatic	Automatic scales	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Agate Dipping	Chocolate coating paper	Matthias Paper Corp., Phila., Pa.
Aico	Composition, cold molded	American Insulator Corp., New Freedom, Pa.
Air-Flo	Bottle cleaning and filling machine	Karl Kiefer Machine Co., Cincinnati, O.
Air Insulated	Featherweight molded containers	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Air Line	Jar cleaning machine	Karl Kiefer Machine Co., Cincinnati, O.
Air-O-Seal	Cellophane covered coffee bag	Thomas M. Royal & Co., Phila., Pa.
Ajax	Steel shipping containers	Sexton Can Co., Everett, Mass.
Ajax Glaze	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Alcoa	Aluminum products	Aluminum Company of America, Pittsburgh, Pa.
Aldex	Filter paper	Aldine Paper Co., New York, N. Y.
Allison	Bag closing machine	B. F. Gump Co., Chicago, Ill.
All-Purpose	Metal caps for home canning	Anchor Hocking Glass Corp., Lancaster, O.
Allure	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
All-Weather	Weatherproofed displays for outdoor use	Badger Merchandising Displays, Inc., Milwaukee, Wis.
All-Weather	Rain-repellent kraft sheet	Bagpak, Inc., New York, N. Y.
Alseco	Seals or closures for glass containers	Aluminum Seal Co., New Kensington, Pa.
Alter-Proof	Tear-off band tamperproof	Aluminum Seal Co., New Kensington, Pa.
Alum-Cote	Aluminum metal coating	Watson-Standard Co., Pittsburgh, Pa.
Alumette	Aluminum coated paper	Kupfer Bros. Co., New York, N. Y.
Aluminite	Metallic-coated papers	Keller-Dorian Corp., New York, N. Y.
Aluminite Mezzotint	Metallic-coated printed paper	Keller-Dorian Corp., New York, N. Y.
Alvac	Vacuum tumbler closure	Aluminum Seal Co., New Kensington, Pa.
Amekine	Synthetic rubber dropper nipples	Pennsylvania Glass Products Co., Pittsburgh, Pa.
American Beauty	Box cover paper	C. R. Whiting Co., Inc., Hackensack, N. J.
American Prints	Fancy printed, patriotic	Louis Dejonge & Co., New York, N. Y.
Amerine	Composition, cold molded	American Insulator Corp., New Freedom, Pa.
Amerisol	Coatings, protective resins, lacquer solutions	American Resinous Chemicals Corp., Peabody, Mass.
Amerite	Urea and phenolic resins	American Resinous Chemicals Corp., Peabody, Mass.
Ameroid	Casein	American Plastics Corp., New York, N. Y.
Amerseal	Lug caps, metal boxes	Anchor Hocking Glass Corp., Lancaster, O.
Amerseal	Pouring spout with screw cap closure	Continental Can Co., New York, N. Y.
Amkleer	Cellophane bags and envelopes	American Paper Goods Co., Kensington, Conn.
Ampaco	Paper mailing boxes	H. Fleisig, Inc., New York, N. Y.
Ampfil	Ampoule filling machine	PerfeKtum Products Co., New York, N. Y.
Amphenol	General trade mark	American Phenolic Corp., Chicago, Ill.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Amprinko	Printing inks	American Printing Ink Co., Div. General Printing Ink Corp., Chicago, Ill.
Ampseal	Ampoule sealing machine	PerfeKtum Products Co., New York, N. Y.
Ampwash	Ampoule and vial washing machine	PerfeKtum Products Co., New York, N. Y.
Amscan	Can sealing compound	The Max Ams Machine Co., Bridgeport, Conn.
Amsco	Closing machine (double seamer)	The Max Ams Machine Co., Bridgeport, Conn.
Amseal	Can sealing compound	The Max Ams Machine Co., Bridgeport, Conn.
Amsco	Rotary high speed bag sealers	Amsco Packaging Machinery Inc., Long Island City, N. Y.
Amstar	Cork, metal and wood closures	American Star Cork Co., Inc., Bklyn. N. Y.
Amstex	Can sealing compound	The Max Ams Machine Co., Bridgeport, Conn.
Amyloid	Coated starch sheeting	American Products Mfg. Co., New Orleans, La.
Anchor	Metal and molded closures, sealing machines	Anchor Hocking Glass Corp., Lancaster, O.
Anchor	Steel strapping	Signode Steel Strapping Co., Chicago, Ill.
Anchorglass	Glass bottles, jars, jugs, tumblers	Anchor Hocking Glass Corp., Lancaster, O.
Androck	Wire display fixtures, floor and counter types	Washburn Co., Rockford, Ill.
Angel Glo Satin	High lustre satin	Taffel Bros., Inc., New York, N. Y.
Angle-Loc	Folding box for baked goods	The Ohio Boxboard Co., Wadsworth, O.
Anilliner	Rotary aniline press	Kidder Press Co., Inc., Dover, N. H.
Anilink	Aniline ink, dye or pigmented type	Rotogravure Div., General Printing Ink Corp., New York, N. Y.
Anilink Kleensolve	Solvent, cleaning, for knurled rollers	Rotogravure Div., General Printing Ink Corp., New York, N. Y.
Anilox	Aniline inks	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Apaco	Folding cartons, corrugated shipping cases	Atlanta Paper Co., Atlanta, Ga.
Apex Inks	Marking inks	Adolph Gottscho, Inc., New York, N. Y.
Apex	Steel strapping	Signode Steel Strapping Co., Chicago, Ill.
Aqualeen	Transparent greaseproof papers	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Aquapearl	Cast phenolic pearl shades	Catalin Corp., New York, N. Y.
Aqua-Seal	Moisture-resistant carton board	The Ohio Boxboard Co., Wadsworth, O.
Aquasette	Water repellent paper	Kupfer Bros. Co., New York N. Y.
Aquasol	Stripping gum	Stein, Hall & Co., Inc., New York, N. Y.
Aquatex	Waterproof closure for multiwall paper bags	Bemis Bro. Bag Co., St. Louis, Mo.
Aquatite	Resinous adhesive	National Adhesives, New York, N. Y.
Arabol	Adhesive	Arabol Mfg. Co., New York, N. Y.
Araflex	Adhesive	Arabol Mfg. Co., New York, N. Y.
Aratex	Adhesive	Arabol Mfg. Co., New York, N. Y.
Arenco	Automatic packaging machines	Arenco Machine Co., Inc., New York, N. Y.
Argent Silver Print	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Argette	Box paper	Kupfer Bros. Co., New York, N. Y.
Aristo	Confectionery bags	American Paper Goods Co., Kensington, Conn.
Aristocrat	Folding paper boxes	Edwin J. Schoettle Co., Phila. Pa.
Aristocrat	Wax-lined food tray	Sutherland Paper Co., Kalamazoo, Mich.
Aristokraft	Cellophane garment bags	Central States Paper & Bag Co., St. Louis, Mo.
Aristowax	Paraffin wax	Petroleum Specialties, Inc., New York, N. Y.
Arksafe	Crinkled kraft linings for bags, barrels, drums and boxes. Crinkled paper in rolls and sheets	Arkell Safety Bag Co., New York, N. Y.
Armalloy	Collapsible tube metal	New England Collapsible Tube Co., Chicago, Ill.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Arrowhead	Inks and Varnishes	Howard Flint Ink Co., Detroit, Mich.
Artboxtone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Artcote	Pyroxylin metallic coated papers	Artcote Papers, Inc., Irvington N. J.
Art-Craft	Fancy embossed paper	Springfield Coated Paper Corp., Camden, N. J.
Artex	Leather substitute paper	Bradner Smith & Co., Chicago, Ill.
Art Finished Pastels	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Art Floral	Brightwood kid finish papers	Holyoke Card & Paper Co., Springfield, Mass.
Art Gingham	Brightwood kid finish papers	Holyoke Card & Paper Co., Springfield, Mass.
Artillery	Box cover	District of Columbia Paper Mills, Inc., Washington, D. C.
Artmold	Molded plastic caps	Armstrong Cork Co., Lancaster, Pa.
Art Pastels	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Art Pockets	Folders with eyelet and long fasteners	Henry Schmidt & Bro., Inc., Phila., Pa.
Asphaltite	Board impregnated with odorless asphaltum	National Container Corp., Long Island City, N. Y.
Athos	Cover paper	United Mfg. Co., Springfield, Mass.
Atlasol	Adhesives	Atlas Gum & Sizing Co., New York, N. Y.
Atlasta	Paper food containers	Stevens & Thompson Paper Co., Greenwich, N. Y.
Auger-Vac	Filling equipment	Stokes & Smith Co., Frankford Phila., Pa.
Aulcold	Quick-drying finish for metal and wood	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Aulflex	Flexible synthetic resin finish	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Aulspar	Water-resistant spar varnish	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Aultone	Pyroxylin lacquer for air-dried metal finishing	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Autoclench	Stapler	Bostitch, Inc., East Greenwich, R. I.
Autofoil	Roll leaf	Coughlin Mfg. Co., New York, N. Y.
Autokrat	Collapsible paper boxes	Edwin J. Schoettle Co., Phila. Pa.
Auto-Pac	Automatic folding glued cartons	Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.

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B.D.	Kraft papers	Bulkley, Dunton & Co., New York, N. Y.
B-M Wrap	Moistureproof wrapping	Plastic Coating Corp., Holyoke, Mass.
"B" Brand	Tin cans and closing machines	National Can Corp., New York, N. Y.
Babytone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Bagpak	Multi-wall paper bag filling and closing equipment	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Bagpakers	Bag filling and closing machinery	Bagpak, Inc., New York, N. Y.
Bakelite	Plastics and resins	Bakelite Corp., New York, N. Y.
Baktak	Envelope back seam gum	Stein, Hall & Co., Inc., New York, N. Y.
Ballyhoo	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Bandbox Stripes	Printed papers, fancy	Louis Dejonge & Co., New York, N. Y.
Barkstone	Imitation cork box covers	District of Columbia Paper Mills, Inc., Washington, D. C.
Bar-Nun	Bag feeders, openers, weighers and closers	B. F. Gump Co., Chicago, Ill.
Bar-Nun Auto Check	Automatic net weighers	B. F. Gump Co., Chicago, Ill.
Barque	Print box paper	The Marvellum Co., Holyoke, Mass.
Barr-Kap	Bar use caps	Aluminum Seal Co., New Kensington, Pa.
Barroll Nozzle	Can pouring spout	The Aridor Co., Chicago, Ill.
Barroll Nozzle	Special nozzle with screw closure	Continental Can Co., New York, N. Y.
Bas Relief	Gold and silver topped embossed paper	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Bayru	High strength fibreboard	The Rogers Paper Mfg. Co., Manchester, Conn.
Beacon	Inturned lug caps	Anchor Hocking Glass Corp., Lancaster, O.
Beau Tye	Cotton ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Beauwood	Decorative paper	Hazen Paper Co., Holyoke, Mass.
Bedford Cord	Embossed mica paper	Hazen Paper Co.. Holyoke, Mass.
Bee-line	Automatic labeler	Economic Machinery Co., Worcester, Mass.
Beetle	Urea-formaldehyde molding material, adhesives	American Cyanamid Co., Plastics Div., New York, N. Y.
Bells and Stars	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Bemis Special	Bag closing thread	Bemis Bros. Bag Co., St. Louis, Mo.
Bend-N-Rap	Flexible wrapping	Ajax Box Co., Chicago, Ill.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Bendall	Attachment for steel rule bender	J. F. Helmold & Bro., Inc. Chicago, Ill.
Ben Mont	Gift wrappings, tissues, glassine bags, shredded waxed papers	Ben Mont Papers, Inc., Bennington, Vt.
Bergmann	Ice cream fillers	Horix Mfg. Co., Pittsburgh, Pa.
Be Square	Micro-crystalline waxes	Bareco Oil Co., Tulsa, Okla.
Bethcolite	Tin plate	Bethlehem Steel Co., Bethlehem, Pa.
Betterbilt	Set-up paper boxes	Thoma Paper Box, Inc., Buffalo, N. Y.
Better-Pac	Sealing tape machine	Better Packages, Inc., Shelton, Conn.
Big Chief	Glass bottles	Owens-Illinois Glass Co., Toledo, O.
Birch	Box cover	District of Columbia Paper Mills, Inc., Washington, D. C.
Birchette	Box paper	Kupfer Bros. Co., New York.
Blackbird Embossed	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Blackol	Varnished paper liner	General Felt Products, Inc., Bklyn, N. Y.
Blacktone	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Blanchette	Box paper	Kupfer Bros. Co., New York.
Bliss	Wire stitchers	Dexter Folder Co., New York.
Bliss	Solid fibre shipping containers	Robert Gair Co., Inc., New York, N. Y.
Block Board	Heavy pressed board signs	Chaspec Mfg. Co., New York.
Blossomtime	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Blue Bird	Paper labels	Wheeler-Van Label Co., Grand Rapids, Mich.
Blu-Kor	Gummed cloth tape	The Gummed Products Co., Troy, O.
Blum	Testing machines	The LaBoiteaux Co., Inc., Cincinnati, O.
Blum-O-Matic	One and two piece cartons	Blum Folding Paper Box Co., Inc., Bklyn, N. Y.
Bond	Gross weighing and filling machines	U. S. Automatic Box Machinery Co., Inc., Roslindale, Boston Mass.
Bondcor	Corrugated box adhesive	Stein, Hall & Co., Inc., New York, N. Y.
Bond-Crowns	Crowns for beverage bottles and cans	Bond Mfg. Corp., Inc., Wilmington, Del.
Boosters	Portable belt conveyors	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Bo-Seals	Pre-tied, cellulose bows	Stark Bros. Ribbon Corp., New York, N. Y.
Bostitch	Wire staples, staplers, stitchers, tackers and stitching wire	Bostitch, Inc., East Greenwich, R. I.
Boston	Wire stitchers	Dexter Folder Co., New York, N. Y.
Bouquet	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Boxcrafters	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Brad-Tite	Specialty wrappers for bread and food	Dixie Wax Paper Co., Inc., Dallas, Texas
Brazilian Bright	Nature papers	Bradner Smith & Co., Chicago, Ill.
Brighten Leaf	Roll leaf	Griffin, Campbell, Hayes, Walsh, Inc., New York, N. Y.
Bright Spots	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Brightwood	Box covering papers	Holyoke Card & Paper Co., Springfield, Mass.
Brightwood	Folding box glue	Stein, Hall & Co., Inc., New York, N. Y.
Brightwood	Paper box making machine	U. S. Automatic Box Machinery Co., Inc., Roslindale, Boston, Mass.
Brightwood Cameo	Box cover paper	Holyoke Card & Paper Co., Springfield, Mass.
Brightwood Polychrome	Box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Brightwood Sateens	Box covering paper	Holyoke Card & Paper Co., Springfield Mass.
Brilliant Metallics	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Britecote	Paper stock	Brooks Bank Note Co., Springfield, Mass.
Broadside	Folding carton	Robert Gair Co., Inc., New York, N. Y.
Brocade	Printed embossed paper	Hampden Glazed Paper and Card Co., Holyoke, Mass.
Broken Back	Patented display container	Brooks Bank Note Co., Springfield, Mass.
Bronzart	Counter and window display and point of sale material	Bronzart Metals Co., New York, N. Y.
Bronzoid	Embossed signs	Chaspec Mfg. Co., New York.
Brooks Twin	Double unit display container	Brooks Bank Note Co., Springfield, Mass.
Brownie	Beer bottle (non-returnable)	Brockway Glass Co., Inc., Brockway, Pa.
Brownskin	Impregnated waterproof wrapper	Angier Corp., Framingham, Mass.
Brownskin Tarpaulins	Covers for outdoor storage	Angier Corp., Framingham, Mass.
Brownskin Vaporseal	Waterproof, vapor-resisting tape	Angier Corp., Framingham, Mass.
Bruno	Semi-automatic can filling machine	The Vol-U-Meter Co., Buffalo, N. Y.
Brunswick Homespuns	Paper for box coverings	Pejepscot Paper Co., New York, N. Y.
Buckskin	Kraft lined boxes	Morris Paper Mills, Chicago, Ill.
Bulkan	Paper can (for bulk ice cream)	The Sealright Co., Inc., Fulton, N. Y.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Bulkbinding	Steel Strapping	Signode Steel Strapping Co., Chicago, Ill.
Bulk-Flo	Elevator-conveyor-feeder	Link Belt Co., Chicago, Ill.
Burlabox	Export water-resistance containers	National Container Corp., Long Island City, N. Y.
Butan	Imitation leather	Bradner, Smith & Co., Chicago, Ill.
Butacite	Polyvinyl butyral resin	E. I. du Pont de Nemours & Co. Inc., Wilmington, Del.

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CRCO	Labeling and casing equipment	Chisolm-Ryder Co., Inc., New Way Div., Hanover, Pa.
CT	Continuous thread screw caps	Phoenix Metal Cap Co., Chicago, Ill.
Cakepak	Grease-proof labels	Tompkins' Label Service, Phila., Pa.
Camachines	Slitting and roll winding machines	Cameron Machine Co., Bklyn, N. Y.
Camel Brand	Corrugated containers	The Ashtabula Corrugated Box Co., Ashtabula, O.
Cameo-Cut	Cut out letters, ornament signatures	Cameo Die & Label Co., New York, N. Y.
Cameoflex	Iridescent label printing process	Cameo Die & Label Co., New York, N. Y.
Cameo-Shine	Aluminum foil substitute	Cameo Die & Label Co., New York, N. Y.
Cameron	Can making machinery	Cameron Can Machinery Co., Chicago, Ill.
Camlet	Two-tone embossed paper	Springfield Coated Paper Corp., Camden, N. J.
Campac	Pouring sifter, round box closure	Cambridge Paper Box Co., Cambridge, Mass.
Canco	Miscellaneous tin cans and containers	American Can Co., New York, N. Y.
Candy Stripes	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Canisco	Fibre board	Canister Co., Inc., Phillipsburg N. J.
Canno	Belt conveyor	Karl Kiefer Machine Co., Cincinnati, O.
Canvas	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
CaPoM	Automatic screw capping machines	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Capico	Printing inks	Capitol Printing Ink Co., Inc., Washington, D. C.
Capseal	Coated paper cap liners	Irvington Varnish & Insulator Co., Irvington, N. J.
Captive Cap	Collapsible tube	National Collapsible Tube Co., Providence, R. I.
Carboflim	Coated wood gum sheeting	American Products Mfg. Co., New Orleans, La.
Cardolite	Resins	Irvington Varnish & Insulator Co., Irvington, N. J.
Carnival	Embossed foil box papers	Hazen Paper Co., Holyoke, Mass.
Carpac	Reinforced gummed tape	Atlantic Gummed Paper Corp., Bklyn, N. Y.
Carpenter	Fibre drums	Carpenter Container Co., Inc., Bklyn, N. Y.
Carry-Safe	Egg carton	Self-Locking Carton Co., Chicago, Ill.
Caseal	Closure	Owens-Illinois Glass Co., Toledo, O.
Catabond	Phenolic resin adhesive	Catalin Corp., New York, N.Y.
Catalin	Cast phenolic resin	Catalin Corp., New York, N.Y.
Catapak	Phenolic molding compound	Catalin Corp., New York, N.Y.
Catavar	Phenolic resin adhesive	Catalin Corp., New York, N.Y.
Ceco	Carton folding, closing and glue sealing machines	Container Equipment Corp., Newark, N. J.
Cedar	Woodgrain box papers	Hazen Paper Co., Holyoke, Mass.
Celata	Opaque, transparent, and translucent cellulose acetate in colors.	E. L. Cournand, Inc. New York, N. Y.
Ceglin	Cellulose finishes for textiles	Sylvania Industrial Corp., New York, N. Y.
Cello-Face	Bag with cellophane front and glassine back	Mason Envelope Co., New York, N. Y.
Cellophane	Transparent cellulose sheeting	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Cellophane	Transparent cellulose sheeting	Sylvania Industrial Corp., New York, N. Y.
Cello-Bond	Cellophane cement	Paisley Products, Inc., Chicago, Ill.
Celloprinter	Cellophane printing machine	Kidder Press Co., Inc., Dover, N. H.
Cello-Safe	Cellophane lollypop sticks	Fibre Cord Co., New York, N. Y.
Cellosheen	Super-transparent glassine	Deerfield Glassine Co., Monroe Bridge, Mass.
Cello Tape	Cellulose tape	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Cell-U-Art	For packaging men's underwear, lingerie, candy, etc.	Traver Corp., Chicago, Ill.
Cellucolor	Wrappers	Shellmar Poducts Co., Mt. Vernon, O.
Cello-Gums	Adhesives for gluing transparent sheeting	National Adhesives, New York, N. Y.
Cellulin	Wrappers	Shellmar Products Co., Mt. Vernon, O.
Celluloid	Cellulose nitrate base; sheets, rods, tubes, rolls	Celanese Plastics Corp., New York, N. Y.
Celluplastic	Sheet-formed acetate vials and tubes	Celluplastic Corp., Newark, N. J.
Cell-U-Print	Varnished bags	Thomas M. Royal & Co., Phila., Pa.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Cellusuede	Flock paper	Stevens, Nelson Paper Corp. New York, N. Y.
Cellusuede	Velour paper	Cellusuede Products, Inc., Rockford, Ill.
Cellutin	Grease resistant paper	The Cellutin Corp., Holyoke, Mass.
Celolustre	Box coating	National Metal Edge Box Co., Phila., Pa.
Celonite	Cellulose nitrate plastic sheeting	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Celons	Secondary bottle closures	Celon Co., Madison, Wis.
Cel-O-Seal	Cellulose caps and bands	Armstrong Cork Co., Lancaster, Pa.
Cel-O-Seal	Cellulose Band	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Celoshine	Waxed glassine bags with window	Dixie Wax Paper Co., Inc., Dallas, Texas
Celowax	Waxed sulphite	Riegel Paper Corp. ,New York, N. Y.
Cel-Spar	Box covering papers	Paper City Mfg. Co., Inc., Holyoke, Mass.
Cem	Filling and capping machines	Crown Cork & Seal Co., Baltimore, Md.
Cemac	Milk bottle capping machine	Crown Cork & Seal Co., Baltimore, Md
Cemco	Beer filling and capping machines	Crown Cork & Seal Co., Baltimore, Md.
Century	Carton gluer	E. G. Staude Mfg. Co., St. Paul. Minn.
Cerex	High heat-resistant thermoplastic	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Challenger	Cellulose window gluing machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Challis Print	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Chambon	Typographic printing presses	Champlain Co., Inc., New York, N. Y.
Chameleon	Leatherette paper	Springfield Coated Paper Corp., Camden, N. J.
Champion	Rubber type holder	Jas. H. Matthews & Co., Pittsburgh, Pa.
Champion	Envelope mfg. machine	F. L. Smithe Machine Co., Inc., New York, N. Y.
Champion	Adjustable shell making machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Champlain	Roll fed rotogravure printing equipment	Champlain Co., Inc., New York, N. Y.
Chase Test	Heavy duty cotton bags	Chase Bag Co., Chicago, Ill.
Chastik	Adhesive backing	Chaspec Mfg. Co., Inc., New York, N. Y.
Chatoye	Pyroxylin treated box papers	Plastic Coating Corp., Holyoke, Mass.
Check-Weigher	Automatic check-weighing scale	Merrick Scale Mfg. Co., Passaic, N. J.
Cheerio	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Chemco Lac	Quick drying varnish	Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Chemco Lightning Set	Ink compound	Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Chemco Wax	Ink compound	Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Chest Craft	Anti-tarnish silverware chests	Leominster Paper Box Co., Leominster, Mass.
Cheviot	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Cheviot	Paper box covering	Pejepscot Paper Co., New York, N. Y.
Chevron Print	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Chick Pullman	Corrugated chick shipping containers	Inland Container Corp., Indianapolis, Ind.
Chilton	Metal inlaying in plastics	Plastic Inlays, Inc., Summit, N. J.
Christmas Candle	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Christmas Ribbons	Fancy printed paper	Louis Dejonge & Co., New York, N. Y.
Cinati	Liquid bottling machine	Karl Kiefer Machine Co., Cincinnati, O.
Cinati Junior	Liquid bottling machine	Karl Kiefer Machine Co., Cincinnati, O.
Cin-Made	Fibre cans	The Cin-Made Corp., Cincinnati, O.
Circle "A"	Molded and metal caps, corks and glass containers	Armstrong Cork Co., Lancaster, Pa.
Citrastrap	Steel strapping	Acme Steel Co., Chicago, Ill.
Clarbond	Case sealing glue	Clark Stek-O Corp., Rochester, N. Y.
Clargum	Bottle labeling glue	Clark Stek-O Corp., Rochester, N. Y.
Clarophane	Window bags	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Clarpic	Pick-up glue for labeling cans	Clark Stek-O Corp., Rochester, N. Y.
Clarkseal	Liquid glue for sealing cases	Clark Stek-O Corp., Rochester, N. Y.
Clartac	Carton sealing glue	Clark Stek-O Corp., Rochester, N. Y.
Clartab	Ready mixed adhesive for general purposes	Clark Stek-O Corp., Rochester, N. Y.
Clean-Glaze	White machine-glazed paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Clearit	Asbestos	Scientific Filter Co., New York, N. Y.
Clearseal	Coating for fabrics and paper	Cleaveland Lab. & Mfg. Co., Inc., Peapack, N. J.
Closeseal	Heat sealing glassine	Hartford City Paper Co., Hartford City, Ind.
Closeseal	Thermoplastic coated acetate	General Laminating, Inc., New York, N. Y.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Cleanite	Cellulose acetate containers	Celluplastic Corp., Newark, N. J.
Clearview	Cellophane bags	Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Clear-Vu-Mason	Home canning mason jars	Brockway Glass Co., Inc., Brockway, Pa.
Cleveco	Lined fibre can	Cleveland Container Co., Cleveland, O.
Click-Top	Hinged cover box	National Folding Box Co., New Haven, Conn.
Climax	Bottle wrappers	The Hinde & Dauch Paper Co., Sandusky, O.
Clipper	Cellophane bag making machine	Modern Containers, Inc., Los Angeles, Calif.
Clipper Made	Cellophane bags	Modern Containers, Inc., Los Angeles, Calif.
Cloud	Paper box covering	Pejepscot Paper Co., New York, N. Y.
Clover Leaf	Protective coatings	Clover Leaf Paint & Varnish Corp., Long Island City, N. Y.
Cloz-It	Closing machine (hand stapling) for plywood drums	Seymour & Peck Co., Chicago, Ill.
Coach and Four	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Coated Lithwite	Coated box board	The Gardner-Richardson Co., Middletown, O.
Code-O-Matic	For code or control number printing	New Jersey Machine Corp., Hoboken, N. J.
Coldflex	Cold flexible glue	Arvey Corp., Jersey City, N. J.
Coilwrap	Spiral wrapping	Angier Corp., Framingham, Mass.
Collofilm	Adhesive	Stein, Hall & Co., Inc., New York, N. Y.
Colodense	Wrappers	Shellmar Products Co., Mt. Vernon, O.
Colorama	Pyroxylin coated metallic papers in brilliant colors	Hazen Paper Co., Holyoke, Mass.
Colorettes	Printed cellophane flower pot wrappers	The Dobeckmun Co., Cleveland, O.
Colorfilm	Cellulose laminated coated paper	The Dobeckmun Co., Cleveland, O.
Colorgraphic	Transparent signs and calendars	The U. S. Printing & Litho Co., Cincinnati, O.
Coloroid	Applied finishes to bottles and jars	Coloroid Co., Inc., Cleveland, O.
Coloroid	Custom finishes (lacquer)	Double Duty Products, Inc., Cleveland, O.
Color-Pak	Colored shipping containers and floor displays	The U. S. Corrugated-Fiber Box Co., Indianapolis, Ind.
Colorstitch	Colored stapling and stitching wire	Acme Steel Co., Chicago, Ill.
Col-O-Tex	Artificial leather	Columbus Coated Fabrics Corp., Columbus, O.
Colt-Tye	Cotton ribbons and ties	Fibre Cord Co., New York, N. Y.
Colt Air	Insulated containers	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Coltjems	Semi-precious stones (plastics)	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Coltrock	Phenolic	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Coltwood	High impact phenolic	Colt's Patent Fire Arms Mfg. Co , Hartford, Conn.
Columbia	Hand numbering machines	Wm. A. Force, & Co., Inc., Bklyn, N. Y.
Columbus	Overweight - underweight scales	The Exact Weight Scale Co. Columbus, O.
Comet	Sealing tapes Box stays	McLaurin-Jones Co., Brookfield, Mass.
Comet	Out-folding carton gluer	E. G. Staude Mfg. Co., St. Paul, Minn.
Commando	Protective paper	Louis Dejonge & Co., New York, N. Y.
Common Sense	Jars and bottles	Owens-Illinois Glass Co., Toledo, O.
Complete Satinstone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Complimentary Print	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Computagram	Computing scale	Toledo Scale Co., Toledo, O.
Concore	Boxboard cartons and containers	Container Corp. of America, Chicago, Ill.
Congo	Casein metallic box papers	Hazen Paper Co., Holyoke, Mass.
Conemee	Box cover paper	Matthias Paper Corp., Phila., Pa.
Consolidated	Textile bag closers	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Container Slotter	Corrugated container slotter and creaser	E. G. Staude Mfg. Co., St. Paul, Minn.
Conti-Chrome	Screenless color reproductions	Continental Lithograph Corp., Cleveland, O.
Conti-Glo	Fluorescent lithographed displays lacquers and coatings	Continental Lithograph Corp., Cleveland, O.
Conti-Glo Line	Ultraviolet assemblies	Continental Lithograph Corp. Cleveland, O.
Continental Gloss	Coated color embossed	Keller-Dorian Corp., New York, N. Y.
Continental Metalac	Coated color embossed, printed	Keller-Dorian Corp., New York, N. Y.
Cord-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Cordunette	Imitation cloth paper	C. R. Whiting Co., Inc., Hackensack, N. J.
Corkmate	Imitation cork paper	C. R. Whiting Co., Inc., Hackensack, N. J.
Corktec	Imitation cork paper	Paper Affiliates Co., Inc., New York, N. Y.
Cork-Tex	Cork products (discs, sheets, rods, slabs etc.)	Bond Mfg. Corp., Inc., Wilmington, Del.
Corley-Miller	Wrapping and sheeting machines	Miller Wrapping & Sealing Machine Co., Chicago, Ill.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Corning Brand	Glass rod, tubing and tumblers	Corning Glass Works, Corning, N. Y.
Corrodek	Window trimming and greaseproof paper	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Corroflex	Flexible corrugated paper	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Corru-Fibre	Printing inks	J. M. Huber, Inc., New York, N. Y.
Corrucrepe	All directional water creped kraft	Cincinnati Industries, Inc., Cincinnati (Lockland), O.
Corruflex	Display packages	Waldorf Paper Products Co., St. Paul, Minn.
Corrulined	Waterproof, paper-lined (vegetable glue) fabrics	Cincinnati Industries, Inc., Cincinnati (Lockland), O.
Conseal	Roll-on tamperproof over cork closure	Aluminum Seal Co., New Kensington, Pa.
Cosmalite	Plastic impregnated paper tubes	The Cleveland Container Co., Cleveland, O.
Cosmoline	Rust preventative compound	E. F. Houghton & Co., Phila., Pa.
Cotacord	Decorative tying cord—plastic covered	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Cottonluxe	Anti-tarnish sewn containers	Cottonluxe Mfg. Co., New York, N. Y.
Cottrel-Heinrich	Multi-color aniline printing press	H. H. Heinrich, Inc., New York, N. Y.
Counterboy	Sealing tape machines	Better Packages, Inc., Shelton, Conn.
Counter Clerk	Counter merchandising displays	Badger Merchandising Displays, Inc., Milwaukee, Wis.
Cover-Dri	Waterproof paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Coverite	Milk bottle closure	Sealright Co., Inc., Fulton, N.Y.,
Cradle	Nursing bottles	Owens-Illinois Glass Co., Toledo, O.
Crate Top Coating	Asphalt compound	The Davison Chemical Corp. Baltimore, Md.
Crescent	Transparent waxed paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Cresco	Printing inks	Crescent Ink & Color Co. of Pa., Phila., Pa.
Crestone	Aniline ink	Crescent Ink & Color Co. of Pa., Phila., Pa.
Crest-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Cretan-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Cretonne	Fancy printed papers	Marvellum Co., Holyoke, Mass
Crimptop	Thermoplastic bag closure	Miller & Miller, Atlanta, Ga.
Crinkle-Tie	Ribbons	Chicago Printed String Co., Chicago, Ill.
Cripseal	Closure	Owens-Illinois Glass Co., Toledo, O.
Crompaco	Water- and oil-proof papers	Cromwell Paper Co., Chicago, Ill.
Cross-Stitch	Embossed mica paper	Hazen-Paper Co., Holyoke, Mass.
Crown	Micro-crystalline wax	Petrolite Corp., Wax Div., New York, N. Y.
Crown	Pottery	The Robinson Clay Products Co., New York, N. Y.
Cry-O-Vac	Protective wrap for frozen foodstuffs	Dewey & Almy Chemical Co., Cambridge, Mass.
Cryptic	Printing inks	Crescent Ink & Color Co. of Pa., Phila., Pa.
Crystal	Asbestos	Scientific Filter Co., New York, N. Y.
Crystal	Coated box coverings	McLaurin-Jones Co., Brookfield, Mass.
Crystal Box	Rigid display container having transparent ends and front	Forbes Litho. Mfg. Co., The, Boston, Mass.
Crystallon	Mother-of-pearl box paper and cardboard	Riegel Paper Corp., New York, N. Y.
Crystal-Pak	Rigid cellulose containers	Transparent Specialties Mfg. Co., Cleveland, O.
Crystalustre	Paper lacquer	Maas & Waldstein Co., Newark, N. J.
Crystlphane	Transparent, thermoplastic paper	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Cumberland	Box covering and printing papers	S. D. Warren Co., Boston, Mass.
Cuplette	Box paper	Kupfer Bros. Co., New York, N. Y.
Cup-Paks	Paper drinking cups	Dixie-Vortex Co., Easton, Pa.
Curley Q	Covered wire	Taffel Bros., Inc., New York.
Cushion Stitch	Siftproof and moistureproof bag closure	Bagpak, Inc., New York, N. Y.
Cush-N-Rap	Unlined corrugated flexible wrapping	Ajax Box Co., Chicago, Ill.

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D-B	Stencil cutting machines; stencilling supplies	Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
DL Krimpac	Semi-automatic packaging machine	Pack-Rite Machines, Milwaukee, Wis.
D-O-K	Waxed kraft paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Dacro	Metal milk bottle caps, coverall	Crown Cork & Seal Co., Baltimore, Md.
Damask	Embossed paper	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Danagh	Counter displays	Robertson Paper Box Co., Inc., Montville, Conn.
Dan-D-Pak	Printed transparent wraps	Daniels Mfg. Co., Rhinelander, Wis.
Darex	Thermoplastic coatings, sealing compounds, adhesives	Dewey & Almy Chemical Co., Cambridge, Mass.
D'Artagnan	Cover paper	United Mfg. Co., Springfield, Mass.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Davco	Silica gel	Davison Chemical Corp., Baltimore, Md.
Daysette	Box paper	Kupfer Bros. Co., New York, N. Y.
Deco Baskets	Paper tills	Waldorf Paper Products Co., St. Paul, Minn.
Deco Board	Decorated board	Waldorf Paper Products Co., St. Paul, Minn.
Deco Boxes	Decorated boxes	Waldorf Paper Products Co., St. Paul, Minn.
Decopad	Padding paper	Geo. H. Sweetnam, Inc., Cambridge, Mass.
Decoufle	Soda straw and toothpick wrapping machines	Arenco Machine Co., Inc., New York, N. Y.
Deerflex	Supercalendered sulphite	Deerfield Glassine Co., Monroe Bridge, Mass.
Defender	Steel strapping	Signode Steel Strapping Co., Chicago, Ill.
Defoamer	Felt cleaners (for paper mfrs.)	Atlas Gum & Sizing Co., New York, N. Y.
Deko-Art	Colored and embossed foil	Reynolds Metals Co., Richmond, Va.
Deltaseal	Bag with pouring spout	Bemis Bro. Bag Co., St. Louis, Mo.
Dependon	Box stays	McLaurin-Jones Co., Brookfield, Mass.
Design Craft	Display sets—corrugated	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Detecto	Scales	Detecto Scales, Inc., Bklyn, N.Y.
Detecto-Gram	Scales	Detecto Scales, Inc., Bklyn, N.Y.
Detecto-Matic	Scales	Detecto Scales, Inc., Bklyn, N.Y.
Dewalco	Adhesives	Dewey & Almy Chemical Co., Cambridge, Mass.
Dewset	Instantaneous vapor setting inks	Frederick H. Levey Co., Inc., New York, N. Y.
Diacell	Filter	Karl Kiefer Machine Co., Cincinnati, O.
Diafane	Lacquered glassine	Riegel Paper Corp., New York, N. Y.
Diagonals	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Diamond	Thermoplastic tubing	The Visking Corp., Chicago, Ill.
Diastretch	Fluted paper used in waterproof, paper-lined fabrics	Fulton Bag & Cotton Mills, Atlanta, Ga.
Dignity Cheviot	Paper for box coverings	Pejepscot Paper Co., New York, N. Y.
Disco	Imitation fabrics and wood grains	District of Columbia Paper Mills, Inc., Washington, D. C.
Diskup	Hot drink cup	The Sealright Co., Inc., Fulton, N. Y.
Dispersite	Natural and synthetic resins or elastomers dispersed in water or other medium	Dispersions Process, Inc., New York, N. Y.
Display-O	Window bags	Thomas M. Royal & Co., Phila., Pa.
Displayologist	Designers	Everett Young Co., Providence, R. I.
Dixie	Carton blanking machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Dixie Cups	Paper drinking cups and containers	Dixie-Vortex Co., Easton, Pa.
Dolita	Cartons and boxes	The Dobeckmun Co., Cleveland, O.
Domino Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Domore	Automatic processing machines	Wood, Nathan & Virkus Co., Inc., Racine, Wis.
Doplex	Cellulose acetate laminated to plain or printed paper laminated cartons	The Dobeckmun Co., Cleveland, O.
Doplex Brilliant	Waterproof paper	The Dobeckmun Co., Cleveland, O.
Dotted Swiss	Box papers	Hazen Paper Co., Holyoke, Mass.
Doubledge	Cellophane wrapper with double thick ends	The Dobeckmun Co., Cleveland, O.
Double-Glaze	Supercalendered paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Double Duty	Wire-handle paper pail (locktop)	Sutherland Paper Co., Kalamazoo, Mich.
Double Plate	Filter	Karl Kiefer Machine Co., Cincinnati, O
Doubletone	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Doughboy	Heat-sealing machines	Pack-Rite Machines, Milwaukee, Wis.
Dowicides	Germicides—fungicides	The Dow Chemical Co., Midland, Mich.
Drawfene	Enamels with special lubricants	Ault & Wiborg, Div. of Interchemical Corp., New York, N. Y.
Dri-Drum	Fibre drum	Beacon Container Co., New York, N. Y.
Dri Ink	Instant drying waterproof ink	Floguil Products, Inc., New York, N. Y.
Dripcut	Syrup dispensers	Na-Mac Products Corp., Los Angeles, Calif.
Dri-Tape	Heat-sealing tape	Seal, Inc., Shelton, Conn.
Drumpak	Corrugated drums	Gaylord Container Corp., St. Louis, Mo.
Drumtite	Can sealing compound	The Max Ams Machine Co., Bridgeport, Conn.
Dry-Hesive	Masking tapes	Gummed Tape & Devices Co., Bklyn, N. Y.
Dry Pack	Waterproof paper	W. Ralston & Co., Inc., Niagara Falls, N. Y.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Dubl-Cushion	Egg carton	Bloomer Bros. Co., Newark, Wayne Co., N. Y.
Dubl-Vu	Cartons, window	Rossotti Lithographing Co. Inc., No. Bergen, N. J.
Dukutone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Dullcoat	Suede mat coated papers	Marvellum Co., Holyoke, Mass.
Dullset	Inks	Geo. H. Morrill Co., Div. General Printing Ink Corp., New York, N. Y.
Dulseal	Gummed matted acetate sheeting	General Laminating, Inc., New York, N. Y.
Dundee Fabrics	Box cover paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Dundee Plaid	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Dunnflex	Gelatine glues	Thomas W. Dunn Co., New York, N. Y.
Duo-Blo	Bottle and jar cleaning machine	Karl Kiefer Machine Co., Cincinnati, O.
Duo-Piston	Filling machine for viscous materials	Karl Kiefer Machine Co., Cincinnati, O.
Duo-Seal	Custom lamination	C. B. Henschel Mfg. Co., Milwaukee, Wis.
Duo-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Duotite	Laminated paper	Nashua Gummed & Coated Paper Co., Nashua, N. H.
Duplex	Labeling machines and accessories	Liquid Carbonic Corp., Chicago, Ill.
Duplex	Lug cap	National Seal Corp., Bklyn, N.Y.
Duplex	Shipping-display boxes	The Hinde & Dauch Paper Co., Sandusky, O.
Durafilm	Moisture-vaporproof cellulose film	The Dobeckmun Co., Cleveland, O.
Duraglas	Glass bottles, jars, containers	Owens-Illinois Glass Co., Toledo, O.; also Owens-Illinois Pacific Coast Co., San Francisco, Calif.
Duranite	Metal finishes	Atlas Powder Co., Zapon Div., Stamford, Conn., & N. Chicago, Ill.
Duranol	Transparent boxes	Joseph H. Meyer Bros., New York, N. Y.
Durapak	Advertising displays Parchmentized crate liner	Paterson Parchment Paper Co., Bristol, Pa.
Duratex	Crinkled kraft wrapping	Chase Bag Co., Chicago, Ill.
Duratin	Tin printing ink	Crescent Ink & Color Co. of Pa., Phila., Pa.
Durawhite	Boxboard	Paper Package Co., Indianapolis, Ind.
Durez	Phenolic molding compounds and resins	Durez Plastics and Chemicals, Inc., N. Tonawanda, N. Y.
Durite	Phenol-furfural, phenol-formaldehyde heat-setting molding compositions	Durite Plastics, Phila., Pa.
Durmas	Boxes and boxboards	Sample-Durick Co., Inc., Indian Orchard, Mass.
Durmaskote	Coating, for boxboard	Sample-Durick Co., Inc., Indian Orchard, Mass.
Duro	High strength fibreboard	The Rogers Paper Mfg. Co., Manchester, Conn.
Dust-Proof	Dispensing spouts	Plastic Engineering, Inc., Cleveland, O.
Du-Tone	Triple edge cellophane ribbons, gift wraps	Du-Tone Ribbon Corp., New York, N. Y.
Dux Bak	Waxed kraft	Central Waxed Paper Co., Chicago, Ill.
Dux-Pak	Carriers for cans and bottles	Brown & Bailey Co., Phila., Pa.

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EZ	Hand operated air cleaner	U. S. Bottlers Machinery Co., Chicago, Ill.
E-Z-Pac	Transparent bags	U. S. Envelope Co., Springfield, Mass.
E-Z Sealer	Jaw type bag krimper	Pack-Rite Machine Corp., Milwaukee, Wis.
E. Z. Tearstrip	Paraffined containers	MonoServiceCo., Newark, N.J.
Eaglon	Gloss printing inks	Eagle Printing Ink Co., Div. General Printing Ink Co., New York, N. Y.
Early American	Fancy printed Christmas papers	Louis Dejonge & Co., New York, N. Y.
Easterlone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Easy Lift	Combination paper bag closure and handle	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Econo-Cards	Display cards	Waldorf Paper Products Co., St. Paul, Minn.
Economy	Mailing bags	Bemis Bro. Bag Co., St. Louis, Mo.
Economy	Fibre drums	Carpenter Container Co., Inc., Bklyn, N. Y.
Economy	Weigher and carton sealer	Triangle Package Machinery Co., Chicago, Ill.
Economy Mailer	Mailing box	The Mason Box Co., Attleboro Falls, Mass.
Economy Sprayko	Liquid spray to prevent ink drying on press	Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Econopac	Specialty wraps	Milprint Inc., Milwaukee, Wis.
Edibauer-Duplex	Automatic net weigher machines	B. F. Gump Co., Chicago, Ill.
Egyptian	Finishes for paper	The Egyptian Lacquer Mfg. Co., New York, N. Y.
Elasti-Cal	Decalcomania for the rubber industry	The Meyercord Co., Chicago, Ill.
Elastikraft	Single stretch creped kraft	Cincinnati Industries, Inc., Cincinnati (Lockland), O.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Elastobond	Rubber-resin emulsion cement	Paisley Products, Inc., Chicago, Ill.
Electrifugal	Liquid pumps	Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Elec-Tri-Pak	Automatic weighers	Triangle Package Machinery Co., Chicago, Ill.
Electro Tempered	Bottles	Owens-Illinois Glass Co., Toledo, O.
Ellisco	Cans	George D. Ellis & Sons, Inc., Phila., Pa.
Elmendorf	Tearing tester	Thwing-Albert Instrument Co., Phila., Pa.
Embrite	Embossed coated papers	The Marvellum Co., Holyoke, Mass.
Emerald Green	Druggists glassware	Owens-Illinois Glass Co., Toledo, O.
Empaco	Housefurnishing ware	National Can Corp., New York, N. Y.
Enduro	Stainless steel for packaging equipment	Republic Steel Corp., Cleveland, O.
Enamelette	Pyroxylin papers	C. R. Whiting Co., Inc., Hackensack, N. J.
Endweld	Tube filling and sealing machine	Karl Kiefer Machine Co., Cincinnati, O.
Engineered Precision	All Gardner-Richardson products	Gardner-Richardson Co., Middletown, O.
Engradel	Transparent decalcomania label	Palm, Fechteler & Co., New York, N. Y.
Enyew	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Ethocel	Ethyl cellulose sheeting	The Dow Chemical Co., Midland, Mich.
Eureka	Rule press Bendall attachment	J. F. Helmold & Bro., Inc., Chicago, Ill.
Evanstik	Tipping in paste	The Commercial Paste Co., Columbus, O.
Everyday	Packaged inks	International Prtg. Ink Div. of Interchemical Corp., New York, N. Y.
Every Use	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Exact Weight	Check-weighing scales	Exact Weight Scale Co., Columbus, O.
Excelite	Thermo-setting plastic materials	Designers for Industry, Inc., Cleveland, O.
Excell-O	Transparent ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Executive	Lacquered wood grains, plain and embossed boxcovers	District of Columbia Paper Mills, Inc., Washington, D. C.
Executive Velour	Suede finish	District of Columbia Paper Mills, Inc., Washington, D. C.
Ex-L-Ite	Tin plate	Republic Steel Corp., Cleveland, O.
Exportex	Water-resistant V-Box, case liner, bag glues	Paisley Products, Inc., Chicago, Ill.
Express	Tear-off type package sealers	Better Packages, Inc., Shelton, Conn.
Express Glue	Liquid labeling paste	National Adhesives, New York.
Eye-Petized	Illustrations of prepared food on labels and folding cartons	The United States Printing & Lithograph Co., Cincinnati, (Norwood), O.

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F.N.A.	Animal glue (cake form)	Paisley Products, Inc., Chicago, Ill.
Fabkote	Pyroxylin coated cellulose base	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Fabrikoid	Pyroxylin coated fabric	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Fabrette	Box paper	Kupfer Bros. Co., New York, N. Y.
Falco	Inks	Fuchs & Lang Mfg. Co., Div. General Printing Ink Corp., New York, N. Y.
Faltex	Inks	Fuchs & Lang Mfg. Co., Div. General Printing Ink Corp., New York, N. Y.
Fanfare	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Fast to Light	Flint glazed papers	Wyomissing Glazed Paper Co., Reading, Pa.
Fent-Onamel	Labels	Fenton Label Co., Phila., Pa.
Fernwood	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Fibercote	Leatherette	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Fiberpak	Fibre shipping drums	Container Co., Div. Continental Can Co., Van Wert, O.
Fibestos	Cellulose acetate	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Fibo-Bilt	Die-cut display material	Badger Merchandising Displays, Inc., Milwaukee, Wis.
Fibo-Board	Special heavy mounting board	Badger Merchandising Displays, Inc., Milwaukee, Wis.
Fibre Lite	Fibre board	Waldorf Paper Products Co., St. Paul, Minn.
Fibreen	Waterproof reinforced paper	Sisalkraft Co., Chicago, Ill.
Fibron	Plastic tape	Irvington Varnish & Insulator Co., Irvington, N. J.
Fiesta Flowers	Fancy printed papers	Louis Dejonge & Co., New York, N. Y.
Fill-Freeze	Cartons	Container Corp. of America, Chicago, Ill.
Filler-Flat	Interior egg case packing, molded pulp	Keyes Fibre Co., Waterville, Me.
Filma-Seal	Bottle closure	Ferdinand Gutmann & Co., Bklyn, N. Y.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Filmonize	Pressure sensitive tape	International Plastic Corp., Morristown, N. J.
Finco	Glue	F. G. Findley, Co., The, Milwaukee, Wis.
Fine Linen	Fancy printed	Louis Dejonge & Co., New York, N. Y.
Fine-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Fitchco	Board lining and paper	Fitchburg Paper Co., Fitchburg, Mass.
"5 Minute"	Fast drying ink	Capitol Printing Ink Co., Inc., Washington, D. C.
Flash Dri	Instantaneous heat setting ink	Fred'k H. Levey Co., Inc., New York, N. Y.
Flash Foils	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Flash-Pac	Automatic glued folding trays	Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Flatwrap	Tightwrap glue for set-up boxes	Paisley Products, Inc., Chicago, Ill.
Flat-Tin-Can	Foil lined envelope	Tension Envelope Corp., Kansas City, Mo.
Flat-Top	Conveyor chain	Link-Belt Co., Chicago, Ill.
Flav-O-Fresh	Coffee bags, also waxed sandwich bags	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Flav-O-Tainer	Air-tight waterproof lined bag	Thomas M. Royal & Co., Phila., Pa.
Fleetfold	Moistureproof-greaseproof tray	Sutherland Paper Co., Kalamazoo, Mich.
Fleurette	Box paper	Kupfer Bros. Co., New York, N. Y.
Flexback	Cold resin emulsion	National Adhesives, New York, N. Y.
Flex-Cote	Collapsible tube coating	Watson-Standard Co., Pittsburgh, Pa.
Flexi-Cap	Atomizer spray and dropper closures	Double Duty Products, Inc., Cleveland, O.
Flexi-Cartons	Paper bags	Bemis Bro. Bag Co., St. Louis, Mo.
Flexiflat	Non-warp paste	Paisley Products, Inc., Chicago Ill.
Flexlined	Waterproof, paper-lined (asphalt) fabric	Cincinnati Industries, Inc., Cincinnati (Lockland), O.
Flexo-Flint	Board lining and box cover	Matthias Paper Corp., Phila., Pa.
Flexo Paste	Non-wrinkling liquid paste	National Adhesives, New York, N. Y.
Flexotic	Folding box with 3 dimensional panels	National Folding Box Co., New Haven, Conn.
Flexpak	Flexible wrapping paper	Hinde & Dauch Paper Co., Sandusky, O.
Flexseal	Thermoplastic coated paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Flintex	Inks and varnishes	Howard Flint Ink Co., Detroit, Mich.
Flintlok	Two-piece folding glued corner style	Hollywood Paper Box Div., The Flintkote Co., Hollywood, Calif.
Flintspray	Anti-offset spray solution	Howard Flint Ink Co., Detroit, Mich.
Flipseal "H"	Metal snap-on type cap for non-vacuum glass containers	The Aridor Co., Chicago, Ill.
Flipseal	"V" metal snap-on type cap for vacuum glass containers	The Aridor Co., Chicago, Ill.
Floradora	Lace box papers	Hazen Paper Co., Holyoke, Mass.
Flor-A-Fresh	Cellophane bags for flowers	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Floralettes	Cellophane mats	Shellmar Products Co., Mt. Vernon, O.
Flosine	Padding paper	George H. Sweetnam, Inc., Cambridge, Mass.
Flowers and Frills	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Flowers and Ribbon	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Follette	Box paper	Kupfer Bros. Co., New York, N. Y.
Foil Sea Shell Swirl	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Foilsman	Foil papers	C. R. Whiting Co., Inc., Hackensack, N. J.
Foldex	Folding box liquid adhesive	Stein, Hall & Co., Inc., New York, N. Y.
Fold-N-Rap	Flexible wrapping	Ajax Box Co., Chicago, Ill.
Foldomatic	Collapsible cartons	Interstate Folding Box Co., Middletown, O.
Fold-Pak	Shipping cartons	Container Corp. of America, Chicago, Ill.
Foldlite	Mailing box	The C. J. Fox Co., Providence, R. I.
Folia Ting	Adhesives and acetate (special)	Mor-Gan Laminating & Foliating Co., New York, N. Y.
Food Packs	Drinking containers	Dixie Cup Co., Easton, Pa.
Food Pak	Plain cellophane bags	Milprint, Inc., Milwaukee, Wis.
Force	Hand numbering machines	Wm. A. Force & Co., Inc., Bklyn, N. Y.
Formator	Machines for cigar industry	Arenco Machine Co., New York, N. Y.
For-Ply	Plywood shipping drum	Seymour & Peck Co., Chicago, Ill.
Fort Wayne	Corrugated egg case	Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
Foxocals	Decalcomania transfers	The Foxon Co., Providence, R. I.
Foxon	Labels, tags, seals	The Foxon Co., Providence, R. I.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Frame-Vue	Folding box, double end and side walls	National Folding Box Co., New Haven, Conn.
Frame-Vue	Paper cartons, double end and side walls	The C. W. Zumbiel Co., Cincinnati (Norwood), O.
Fre-Pac	Ice cream package	Bloomer Bros. Co., Newark, New York State
Freeze-Rite	Frozen food paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Freeztex	Frozen food locker packages	Marathon Corp., Menasha, Wis.
Freshsea	Waxed bags	Dixie Wax Paper Co., Inc., Dallas, Texas
Frigid Board	Cold storage stock	Waldorf Paper Prdoucts Co., St. Paul, Minn.
Frostel	Pyroxylin metallic papers for labels, box coverings, etc.	Plastic Coating Corp., Holyoke, Mass.
Frostex	Frozen foods bags and paper	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Frostofold	Fozen food containers	Interstate Folding Box Co., Middletown, O.
Frost-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Full-Flow	Metal liquid shipping container	Wheeling Corrugating Co., Wheeling, W. Va.
Full Measure	Stock printed cellophane bags	The Dobeckmun Co., Cleveland, O.
Full View	Box window top	W. H. Deisroth Co., Inc., Phila., Pa.
Ful-Lok	Cellophane satchel bottom bags	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Fusedge	Ribbon made of cut sealed acetate fabric	Freydberg Bros.-Strauss, Inc., New York, N. Y.

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Gala	Casein	George Morrell Corp., Muskegon Heights, Mich.
Galom	Casein plastic	George Morrell Corp., Muskegon Heights, Mich.
Gator Hide	Kraft paper	George & Sherrard Paper Co., New York, N. Y.
Gaylord	Fibre boxes and folding cartons	Gaylord Container Corp., St. Louis, Mo.
Gem	Light-duty round nested paper containers	Lily-Tulip Cup Corp., New York, N. Y.
Gem	Micro-crystalline wax	Petrolite Corp., Wax Div., New York, N. Y.
Gemcote	Plastic finishing	Gemloid Corp., Elmhurst, L. I., N. Y.
Gemlike	Jewell effect, sheet form	Gemloid Corp., Elmhurst, L. I., N. Y.
Gemlite	Injection molding	Gemloid Corp., Elmhurst, L. I., N. Y.
Gemloid and Enameloid Cloisonné	Plastic sheets with cloisonné designs	Gemloid Corp., Elmhurst, L. I., N. Y.
Gemstone	Phenol-formaldehyde cast resins	A. Knoedler Co., Lancaster, Pa.
Gem Weld	Transparent flexible covers	Gemloid Corp., Elmhurst, L. I.
General	Box gluing machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Geon Latex	Water-borne polyvinyl resin	The B. F. Goodrich Co., Cleveland, O.
Geon Resins, 100 series	Polyvinyl chloride	The B. F. Goodrich Co., Cleveland, O.
Geon Resins, 200 series	Copolymers of vinyl and vinylidene chloride	The B. F. Goodrich Co., Cleveland, O.
Georgian Silver	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Giant-Curve	Corrugated display material	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Gift Shop	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Glazed Chintz	Printed flint paper	Hampden Glazed Paper and Card Co., Holyoke, Mass.
Globular	Parchment padding paper	George H. Sweetnam, Inc., Cambridge, Mass.
Glo-Ray	Gloss inks	International Prtg. Ink Div. of Interchemical Corp., New York, N. Y.
Gloretta	Box paper	Kupfer Bros. Co., New York.
Gloss Colorcoat	Color gloss surface for packaging	Brooks Bank Note Co., Springfield, Mass.
Glosscote	Boxboard	Brooks Bank Note Co., Springfield, Mass.
Glosstroll	Corrugated paper display material	Excelsior Paper Specialties Co., New York, N. Y.
Glostone	Box covering paper	Paper City Mfg. Co., Inc., Holyoke, Mass.
Gloswite	Patent coated boxboard	Brooks Bank Note Co., Springfield, Mass.
Glow-Cote	Transparent top sizing for labels and wraps	Cambridge Paper Box Co., Cambridge, Mass.
Glue-Fast	Glues	Glue Fast Equipment Co., Inc., New York, N. Y.
Gluex	Animal glue extender	Stein, Hall & Co., Inc., New York, N. Y.
Glu-O-Matic	Automatically glued folding boxes	Spear Box Co., Inc., New York, N. Y.
Glu-Pa-Co	Vegetable glue	The F. G. Findley Co., Milwaukee, Wis.
Glu-Weld	Waterproof adhesive	The F. G. Findley Co., Milwaukee, Wis.
		Union Paste Co., Hyde Park, Mass.
Glu-X-Tender	Blender for animal and flexible glues	The F. G. Findley Co., Milwaukee, Wis.
Goldentone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Goldlite	Imitation foil	Louis Dejonge & Co., New York, N. Y.
Gold-Medal	Solid fibre beer carriers	Gaylord Container Corp., St. Louis, Mo.
Gold Seal	Cap, tin paste cover, drum compounds	Dewey & Almy Chemical Co., Cambridge, Mass.
Goldseal	Colored specialty tapes	Gummed Tape & Devices Co., Bklyn, N. Y.
Goldy	Bottle closure	Aluminum Seal Co., New Kensington, Pa.
Golveneer	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Go Safe	Mailing boxes	Everett Young Co., Providence, R.I.
Gravity	Roller conveyors and spiral chutes	Standard Conveyor Co., N. St. Paul, Minn.
Gravity Gram	Predetermined weight scale	Toledo Scale Co., Toledo, O.
Graywire	Display racks	The Gray Wire Specialty Co., Cleveland, O.
Greaseno	Grease resistant boxboard	Gardner-Richardson Co., Middletown, O.
Greaselite	Grease resistant boxboard	Waldorf Paper Products Co., St. Paul, Minn.
Green Core	Gummed cloth tapes	Mid-States Gummed Paper Co., Chicago, Ill.
Greystone	Clasp envelopes	American Paper Goods Co., Kensington, Conn.
Grip-Tight	Label paste for tin, metals	Paisley Products, Inc., Chicago, Ill.
Grip-Tite	Gummed tape	Chicago Gum Tape Co., Chicago, Ill.
Grizzlybear	Waterproof wrapper	Angier Corp., Framingham, Mass.
Guardian	Tamperproof aluminum bottle closures	Guardian Safety Seal Co., Chicago, Ill.
Guardsman	Cover paper	United Mfg. Co., Springfield Mass.
Gumcraft	Gummed tapes	Gummed Tape & Devices Co., Bklyn, N. Y.
Gumcraft Lifet	Flat label paper	Gummed Tape & Devices Co., Bklyn, N. Y.
Gum Tape-Aid	Tape moistening solution	Paisley Products, Inc., Chicago, Ill.

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H & D	Corrugated shipping boxes	The Hinde & Dauch Paper Co Sandusky, O.
HFN	Gelatinous, semi-iceproof bottle labeling gum	National Adhesives, New York, N. Y.
Haller	Filling machines	Horix Mfg. Co., Pittsburgh, Pa.
Halyard	Wire opener metal cap	Anchor Hocking Glass Corp., Lancaster, O.
Hammerclear	Carton sealing paper	Hamersley Mfg. Co., Inc., Garfield, N. J.
Hammerglass	Glassine paper	Hamersley Mfg. Co., Inc., Garfield, N. J.
Hammerglint	Tarnish resistant paper	Hamersley Mfg. Co., Inc., Garfield, N. J.
Hammer-Parchment	Greaseproof paper	Hamersley Mfg. Co., Inc., Garfield, N. J.
Hampak	Printed transparent wraps	Daniels Mfg. Co., Rhinelander, Wis.
Handelok	Carry bag	Wolf Bros., Phila., Pa.
Handilift	Tiering machine	Standard Conveyor Co., N., St. Paul, Minn.
Handi-Quart	Milk bottles	Owens-Illinois Glass Co., Toledo, O.
Handirol	Gummed package products	Gummed Tape & Devices Co., Bklyn, N. Y.
Handy Service	Package of sterilized glass bottles	Owens-Illinois Glass Co., Toledo, O.
Hang-Rite	Garment holders	Waldorf Paper Products Co., St. Paul, Minn.
Hardshell	Non-rubbing inks	Eagle Printing Ink Co., Div. General Printing Ink Corp., New York, N. Y.
Hard-Tex	Inks	Fuchs & Lang Mfg. Co., Div. General Printing Ink Corp., New York, N. Y.
Hartglass	Embossed sulphite	Hartford City Paper Co., Hartford City, Ind.
Hayssen	Automatic wrapping and slicing machinery	Hayssen Mfg. Co., Sheboygan, Wis.
Hazenkote	Pyroxylin coated paper	Hazen Paper Co., Holyoke, Mass.
Heat-O-Seal	Heatsealing thermium labels	Tomkins' Label Service, Phila., Pa.
Helmco	Displays	Helmco, Inc., Chicago, Ill.
Hercules	Rule cutter	J. F. Helmold & Bro., Inc., Chicago, Ill.
Heresite	Plastic coating and molding compounds	Heresite & Chemical Co. Manitowoc, Wis.
Hermetican	Air tight tamperproof aluminum canister	Guardian Safety Seal Co., Chicago, Ill.
Hermeti-Pak	Folding carton	Frankenberg Bros., Inc., Columbus, O.
Hermeti-Seal	Heat-sealable innerlined carton	Frankenberg Bros., Inc., Columbus, O.
Hermo	Can sealing compound	The Max Ams Machine Co., Bridgeport, Conn.
Hesitco	Plastic hypodermic needle protectors, dropper bulbs	Heat Seal-It Co., Phila., Pa.
Hiawatha	Out-folding carton gluer	E. G. Staude Mfg. Co., St. Paul, Minn.
Hi-Binder	Specialized wrapping materials	The Floyd A. Holes Co., Bedford, O.
Hi-Gear	Automatic cartons	Fibreboard Products Inc., San Francisco, Cal.
Higlo	Gloss printing inks	J. M. Huber, Inc., New York, N. Y.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Hi-Gloss	Coatings and inks	Pope & Gray, Inc., New York.
Hi-Gloss	Base paper for lacquer	S. D. Warren Co., Boston, Mass.
Hi-Low	Composite paper and shipping cartons	Container Corp. of America, Chicago, Ill.
Himes	One-piece box	American Box Board Co., Grand Rapids, Mich.
Hi-Paco	Cartons for sheets, pillow cases, etc.	High Point Paper Box Co., Inc., High Point, N. C.
Hi-Pak	Cellophane bags for bulk groceries	Thomas M. Royal & Co., Phila., Pa.
Hoepner	Automatic scales, dry filling equipment, sewing machines, bag closures	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Holdfast	Black inks	International Printing Ink, Div. of Interchemical Corp., New York, N. Y.
Holdfast	Glues	The F. G. Findley Co., Milwaukee, Wis.
Holly Scroll	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Hollykote	Special moisture and greaseproof treatment on paper board	Hollywood Paper Box, Div. The Flintkote Co., Hollywood, Calif.
Holm Scale	Filling machine	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Hooper	Corrugating, printing, container making machinery	F. X. Hooper Co., Inc., Glenarm, Md.
Hopewell Kraft	Kraft paper products	Hummel-Ross Fibre Corp., Hopewell, Va.
H-Scale	Synthetic pearl essence	Celanese Chemical Corp., New York, N. Y.
Husbilks	Box papers	Hazen Paper Co., Holyoke, Mass.
Humi-Jar	Jar	Owens-Illinois Glass Co., Toledo, O.
Humi-Pak	Waterproof ream wrappers	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Humitube	Bags, pouches, tubes and envelopes of cellophane	Humitube Mfg. Co., Peoria, Ill.
Hyalac	Window signs and decorations	The Meyercord Co., Chicago, Ill.
Hychex	Plastic tubes	Hychex Products, Chicago, Ill.
Hycoloid	Cellulose nitrate tubes and applicators	Celluplastic Corp., Newark, N. J.
Hydratite	Water-resistant paste	National Adhesives, New York, N. Y.
Hydro-Tite	Asphalt center boxboard	Gardner-Richardson Co., Middletown, O.
Hydry	Moisture set inks	E. J. Kelly Co., Kalamazoo, Mich.
Hy-Glaze	Kraft, machine-glazed paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Hy-Glos	Gummed and ungummed labels	Tompkins' Label Service, Phila., Pa.
Hy-Lustre	Gloss inks	Robinson Tag & Label Co., New York, N. Y.
Hyroto	Rotogravure printing machine	Rotogravure Engineering Co., East Boston, Mass.
Hy-Speed	Bottling machinery	Alsop Engineering Corp., New York, N. Y.

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IPI	Printing inks	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Ice Cream Pack	Ice cream fibre drum	Beacon Container Co., New York, N. Y.
Ideal	Elevators, bucket type	B. F. Gump Co., Chicago, Ill.
Ideal	Wire stitching machine	Ideal Stitcher & Mfg. Co., Racine, Wis.
Ideal	Two-tube hand vacuum filler	U. S. Bottlers Machinery Co., Chicago, Ill.
Illinois	Druggists glassware	Owens-Illinois Glass Co., Toledo, O.
Illustra-Color	Reproduction method for displays	U. S. Printing & Lithograph Co., Cincinnati (Norwood), O.
Imperial Plastic Hardware	Handlers, knobs, pulls, etc.	Imperial Molded Products Corp., Chicago, Ill.
Impervite	Enameled paper liner	General Felt Products Div., Standard Cap & Seal Corp., Bklyn, N. Y.
Impervite	Oil treated paper	W. Ralston & Co., Inc., Niagara Falls, N. Y.
Impervo	Outdoor display	Arvey Corp., Jersey City, N. J.
Impervo	Label gum	National Adhesives, New York, N. Y.
Impression	Ink embossed coated paper	The Marvellum Co., Holyoke, Mass.
Inceloid	Resin adhesives, protective coatings, transparent sheeting	American Products Mfg. Co., New Orleans, La.
Inco-Pads	Corrugated colored display material	Inland Container Corp., Indianapolis, Ind.
Inco-Rolls	Single face corrugated colored display	Inland Container Corp., Indianapolis, Ind.
Inco-Steps	Corrugated colored display material	Inland Container Corp., Indianapolis, Ind.
Indette	Box paper	Kupfer Bros. Co., New York, N. Y.
Indur	Phenolic molding compounds, resins, varnishes	Reilly Tar & Chemical Corp., Indianapolis, Ind.
Induwrap	Greaseproof paper	Angier Corp., Framingham, Mass.
Inerwov	Reinforced asphalt laminated gummed tape	Atlantic Gummed Paper Corp., Bklyn, N. Y.
Innercoat	Plain waterproof wrapping	Angier Corp., Framingham, Mass.
Inner-Lined	Prelined cartons	Interstate Folding Box Co., Middletown, O.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Innerstrung	Reinforced waterproof wrapping paper	Angier Corp., Framingham, Mass.
Innerstrung	Reinforced waterproof paper	W. Ralston & Co., Inc., Niagara Falls, N. Y.
"Insite" Signs	Decalcomania transfers	Milprint, Inc., Milwaukee, Wis.
Insulux	Glass block	Owens-Illinois Glass Co., Toledo, O.
Insurok	Custom laminated and molded plastic	The Richardson Co., Melrose Park, Chicago, Ill.
In-Tag	Gravure inks	In-Tag Div., Interchemical Corp., New York, N. Y.
International	Automatic box making machinery	International Paper Box Machine Co., Nashua, N. H.
Isamacol	Stapling equipment	International Staple & Machine Co., Clifton Heights, Pa.
Isyngloss	Transparent waxed paper (self sealing)	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Itstix	Tape, gummed	Nashua Gummed & Coated Paper Co., Nashua, N. H.
Ivanhoe	Paper boxes	Cambridge Paper Box Co., Cambridge, Mass.
Ivorytone	Opaque coated paper	Newark Paraffine & Parchmen, Paper Co., Newark, N. J.

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J.M.	Stripping glue for set-up boxes	Paisley Products, Inc., Chicago, Ill.
JW-Jr.	High-speed bottle washer	U. S. Bottlers Machinery Co., Chicago, Ill.
Jacquard	Embossed and tipped papers	Marvellum Co., Holyoke Mass.
Jalcold	Tin plate	Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Jaypaco	Laminated board	Jaypaco Co., New York, N. Y.
Jaypaco	Wadding tissue	Joe Salwen Paper Co., New York, N. Y.
Jet Black	Micro-crystalline wax	Petrolite Corp., Wax Div., New York, N. Y.
Jiffy	Insulated paper bags, pads	Jiffy Mfg. Co., Hillside, N. J.
Johnson	Machines, carton forming, lining, filling, folding, closing	Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Joniflex	Cloth pressure sensitive tape	Industrial Tape Corp., New Brunswick, N. J.
Judy	Rayon ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Jupiter Gum	Dry form dextrine adhesive	Paisley Products, Chicago, Ill.
Justrite	Marking equipment, industrial inks	Louis Melind, Chicago, Ill.

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K.E.M.	Thermosetting molding compound	Makolot Corp., Boston, Mass.
K V P	Waxed papers plain and printed	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Kake Hot	Pick up cement	The F. G. Findley Co., Milwaukee, Wis.
Kakimaco	Filter	Karl Kiefer Machine Co., Cincinnati, O.
Kala Cork	Cork paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Kalafilm	Wrapping paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Kan-D-Pak	Printed transparent wraps	Daniels Mfg. Co., Rhinelander, Wis.
Kaumark	Water-soluble marking ink	Kaumagraph Co., Wilmington, Del.
Kay-Dee-Pac	Paper pails	Container Corp. of America, Chicago, Ill.
Kaydel	Moisture gauges	Hart Moisture Gauges, Inc., New York, N. Y.
Kaygrey	High strength fibreboard	The Rogers Paper Mfg. Co., Manchester, Conn.
Kaylon	Transparent unsupported film and coated fabrics	Gordon-Lacey Chemical Prods. Co., Maspeth, L. I., N. Y.
Kaypar	High strength fibreboard	The Rogers Paper Mfg. Co., Manchester, Conn.
Kayseel	Case sealing liquid adhesive	Stein, Hall & Co., Inc., New York, N. Y.
Keglined	Beer and ale cans	American Can Co., New York.
Kemgo	Printing compound	Markem Machine Co., Keene, N. H.
Kennecot	Pyroxylin coated papers	C. R. Whiting Co., Inc., Hackensack, N. J.
Kensington	Clasp envelopes	American Paper Goods Co., Kensington, Conn.
Keratol	Imitation leather	Atlas Powder Co., Zapon Div., Stamford, Conn.
Keystone Stay	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Kidette	Box paper	Kupfer Bros. Co., New York.
Kidskin	Pyroxylin box papers	Hazen Paper Co., Holyoke, Mass.
Killie Plaids	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Kimpak	Protective packing, creped wadding	Kimberly-Clark Corp., Neenah, Wis.
Kingcote	Cotton flock	Rayon Processing Co. of R. I., Central Falls, R. I.
King Markwell	Marking and printing inks	Markem Machine Co., Keen, N. H.
Kivar	Artificial leather	The Plastic Coating Corp., Holyoke, Mass.
Klean	Printing inks, lithographic supplies	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Klean Quick	Roller cleaner	International Printing Ink, Div. Interchemical Corp., New York, N. Y.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Kleen Kups	Paper food containers	Mono Containers, Div. Continental Can Co., Newark, N. J.
Kleen Seal	Sanitary tamperproof seal	Mono Containers, Div. Continental Can Co., Newark, N. J.
Kleenway	Garbage and general utility bags	Oneida Paper Prods., Inc., New York, N. Y.; also Continental Bag Specialties Corp., New York, N. Y.
Kleer Glaze	Transparent waxed paper	Central Waxed Paper Co., Chicago, Ill.
Kleerview	Glassine	Rhinelander Paper Co., Rhinelander, Wis.
Kleer View	Waxed glassine	Central Waxed Paper Co., Chicago, Ill.
Kleerwrap	Glassine	Rhinelander Paper Co., Rhinelander, Wis.
Kliktop	Latching hinged-cover box	National Folding Box Co., New Haven, Conn.
Klondike	Gold and silver casein papers	C. R. Whiting Co., Inc., Hackensack, N. J.
Klothwhite	Retail store wrapping paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Knife-O	Closure	Owens-Illinois Glass Co., Toledo, O.
Kodaloid	Cellulose acetate sheeting	Eastman Kodak Co., Rochester, N. Y.
Kodapak	Cellulose acetate sheeting	Eastman Kodak Co., Rochester, N. Y.
Kodatape	Gummed cloth tape	Eastman Kodak Co., Rochester, N. Y.
Koloprint	Automatic direct printing labeling machine (cans, bottles, etc.)	Designers for Industry, Inc., Cleveland, O.
Kork-N-Seal	Initial and re-sealing cap with lever	Continental Can Co., New York, N. Y.
Kork-N-Seal	Can cappers	Crown Cork & Seal Co., Baltimore, Md. Williams Sealing Corp., Decatur, Ill.
Korogel	Soft form of Koroseal	B. F. Goodrich Co., Akron, O.
Korolac	Solution of Koroseal	B. F. Goodrich Co., Akron, O.
Koroseal	Plasticized polyvinyl chloride	B. F. Goodrich Co., Akron, O.
Kote Strip	Ethyl cellulose coating	E. F. Houghton & Co., Phila., Pa.
Kraflex	Gummed kraft paper sealing tape	Central Paper Co., Menasha, Wis.
Krimpac	Specialty wraps	Milprint, Inc., Milwaukee, Wis.
Kromekote	Cast coated high finish paper	The Champion Paper & Fibre Co., Hamilton, O.
Kubro Leatherette	Box cover paper	Kupfer Bros. Co., New York, N. Y.
Kum-Kleen	Labels, pressure-sensitive	Avery Adhesives, Los Angeles, Calif.
KwickKlasp	Mailing boxes	W. H. Deisroth Co., Inc., Phila Pa.
Kwik-Kleen	Filters (water)	The Liquid Carbonic Corp. Chicago, Ill.
Kwikset	Paper cartons	Container Corp. of America, Chicago, Ill.
Kwik-Way	Nameplates	Meyercord Co., Chicago, Ill.
Kyspad	Interior egg case packing, molding pulp	Keyes Fibre Co., Waterville, Me.

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Labco Fibre	Kraft board	The LaBolteaux Co., Inc., Cincinnati, O.
LabeLid	Ointment boxes	Columbia Specialty Co., Inc., Baltimore, Md.
Labelrite	Fully automatic labeling equipment	New Jersey Machine Corp., Hoboken, N. J.
Labelstik	Metal ointment boxes	George D. Ellis & Sons, Inc., Phila., Pa.
Lace and Flowers	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Lace Frills	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Lacquerleather	Waterproof leather papers	C. R. Whiting Co., Inc., Hackensack, N. J.
Lac-R-Print	Lacquered bags	Thomas M. Royal & Co., Phila., Pa.
Lafayette	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Lamatex	Ethylcellulose laminated cloth	Wills & Roberts Plastics Mfg. Corp., Pasadena, Calif.
Lamatex Solution	Ethylcellulose laminating lacquer	Wills & Roberts Plastics Mfg Corp., Pasadena, Calif.
Lamcote	Laminating of paper, films	Arvey Corp., Jersey City, N. J.
Lamcote Cover	Cover stock	Arvey Corp., Jersey City, N. J.
Lamcote Fabrics	Cellulose laminated fabrics	Arvey Corp., Jersey City, N. J.
Laminac	Thermosetting copolymer laminating resin	American Cyanamid Co., Plastics Div., New York, N. Y.
Laminam	Laminated paper, cloth, foil	General Laminating Co., New York, N. Y.
Laminizing	Combination of cellulose acetate sheets to paper	U. S. Finishing & Mfg. Co., Chicago, Ill.
Laminoid	Combining of cellulose acetate to paper, textiles	Laminoid, Inc., N. Bergen, N. J.
Lamiphane	Transparent high gloss vinyl finish for labels, wrappers	Stecher-Traung Litho. Corp., Rochester, N. Y.
Lam-Lac	High-gloss lacquer finish	F. N. Burt Co., Inc., Buffalo, N. Y.
Lamoflin	Simplex moistureproof bags or moistureproof liners	Benj. C. Betner Co., Devon, Pa.
Lard Pak	Printed transparent wraps	Daniels Mfg. Co., Rhinelander, Wis.
Latham	Wire stitchers	Dexter Folder Co., New York.
Lattisette	Box paper	Kupfer Bros. Co., New York.

TRADE NAME	NATURE OF TYPE OF PRODUCT	COMPANY & ADDRESS
Lavelle	Box paper	Kupfer Bros. Co., New York, N. Y.
Leafage	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Leathaflex	Leather cement	Paisley Products, Inc., Chicago, Ill.
Leatherette	Box paper	Kupfer Bros. Co., New York, N. Y.
Leatherette	Waterproof leather finished papers	The Marvellum Co., Holyoke, Mass.
Leather Foil	Marking foils for leather	Peerless Roll Leaf Co., Inc., Union City, N. J.
Lenonet	Open-mesh bags	Bemis Bro. Bag Co., St. Louis, Mo.
Lenox Gold	Gold and platinum box coverings	McLaurin-Jones Co., Brookfield, Mass.
Lepaco	Moisture and greaseproof board	Lebanon Paper Box Co., Lebanon, Pa.
Lev-A-Lift	Opening device for friction plug containers	The Lev-A-Lift Co., New York, N. Y.
Levelbest	Containers, shipping	Fibreboard Products, Inc., San Francisco, Calif.
Leverpak	Fibre shipping drums	The Container Co., Div. Continental Can Co., Inc., Van Wert, O.
Liftab	Milk bottle caps	Sealright Co., Inc., Fulton, N. Y.
Liftright	Milk bottle caps	Sealright Co., Inc., Fulton, N. Y.
Lightning	Coated box coverings	McLaurin-Jones Co., Brookfield, Mass.
Lightning Seal	Bread wrappers	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Likwid Proof	Ink	Chemical Color & Supply Co., Div. General Printing Ink Corp., Chicago, Ill.
Lilipack	Paper flour bags	Chase Bag Co., Chicago, Ill.
Lily White	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Linco	Belt conveyor	Karl Kiefer Machine Co., Cincinnati, O.
Link-Belt	Elevating, conveying and power transmission equipment	Link-Belt Co., Chicago, Ill.
Lin-oli-ink	Printing ink, water color	The Braden Sutphin Ink Co., Cleveland, O.
Lion	Adhesives	Manhattan Paste & Glue Co., Inc., Bklyn, N. Y.
Liquid	Labeling machines and accessories	The Liquid Carbonic Corp., Chicago, Ill.
Liquid Plating	A lamination substitute	Mor-Gan Laminating & Foiling Co., New York, N. Y.
Liquid Single	Labeling machines	The Liquid Carbonic Corp., Chicago, Ill.
Liquipak	Fibre shipping drums	The Container Co., Div. Continental Can Co., Inc., Van Wert, O.
Liqui-Wash	Industrial workers' hand soap	Paisley Products, Inc., Chicago, Ill.
Listette	Box paper	Kupfer Bros. Co., New York, N. Y.
Lithochrome	Synthetic varnish to protect metal against corrosive agents	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Lithopaque	Printing process	The Dobeckmun Co., Cleveland, O.
Lithox	Lithographic inks	International Printing Ink, Div. Interchemical Corp, New York, N. Y.
Lithwite	White uncoated boxboard	The Gardner-Richardson Co., Middletown, O.
Loabond	Styrene laminating	Catalin Corp., New York, N. Y.
Loalin	Polystyrene molding compound	Catalin Corp., New York, N. Y.
Loavar	Styrene surface coating	Catalin Corp., New York, N. Y.
Lock-Tite	Dress box	American Box Board Co., Grand Rapids, Mich.
Lock Top	Screw top can with locking lugs	Continental Can Co., New York, N. Y.
Locktop	Paper ice cream can	National Folding Box Co., New Haven, Conn.
Locktop	Paper cans	Morris Paper Mills, Chicago, Ill.
Loc-Rim	Fibre shipping drums	Carpenter Container Corp., Bklyn, N. Y.
Loftee Cotton	Filler for jewelry boxes	Union Wadding Co., Pawtucket, R. I.
Lokseal	Waxed papers	The Specialty Papers Co., Dayton, O.
Loksure	Meat wrapper	The Specialty Paper Co., Dayton, O.
Lookit	Set-up and acetate boxes	Flower City Specialty Co., Rochester, N. Y.
Loomlite	Textile box papers	Hazen Paper Co., Holyoke, Mass.
Lotol	Processed and compounded liquid latex	Naugatuck Chemical Div., U. S. Rubber Co., New York, N. Y.
Low Pressure	Bottle fillers	The Liquid Carbonic Corp., Chicago, Ill.
LoxTite	Partition for packaging candy, cookies, beverages, eggs, fragile commodities, etc.	Traver Corp., Chicago, Ill.
Lucite	Methyl methacrylate resin	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Lumarith C.A.	Cellulose acetate sheets, rods, tubes, films, foils	Celanese Plastics Corp., New York, N. Y.
Lumarith E.C.	Ethyl cellulose base molding materials	Celanese Plastics Corp., New York, N. Y.
Lumarith V.N.	Vinyl chloride acetate films and foils	Celanese Plastics Corp., New York, N. Y.
Lumarith X	High acetyl cellulose acetate molding material	Celanese Plastics Corp., New York, N. Y.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Lumilite	Aluminum powder coated sheet, silver and gold	Louis Dejonge & Co., New York, N. Y.
Lustaseal	Sulphite paper	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Lusteroid	Transparent and colored vials and tubes	Lusteroid Container Co., Inc., South Orange, N. J.
Lustr-Cote	Gloss printing inks	Eagle Printing Ink Co., Div. General Printing Ink Co., New York, N. Y.
Lustrella	Box paper	Kupfer Bros. Co., New York, N. Y.
Lustre-Print	High gloss printed labels and seals	Dennison Mfg. Co., Framingham, Mass.
Lustro	Aniline printing process	Milprint, Inc., Milwaukee, Wis.
Lustrofoil	Marking foil	Peerless Roll Leaf Co., Inc, Union City, N. J.
Lustron	Polystyrene molding compound	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Lustron	Wrapping paper	Hartford City Paper Co., Hartford City, Ind.
Lustseal	Closure	Owens-Illinois Glass Co., Toledo, O.
Lux-Lite	Displays with flashers	Reynolds Metals Co., Richmond, Va.
Luxor Gold	Gold box covering	McLaurin-Jones Co., Brookfield, Mass.
Luxorline	Box cover paper	Matthias Paper Corp., Phila., Pa.
Lyonsdale	Tissue paper	Moyer & Pratt, Inc., Lyons Falls, N. Y.
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"MRK" Resinoid	Caster and truck wheels	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Mailmaster	Mailing box	The Mason Box Co., Attleboro Falls, Mass.
Mainstay	Bag closing twine	Bemis Bro. Bag Co., St. Louis, Mo.
Makalot	Phenol-formaldehyde molding compounds and resins	Makalot Corp., Boston, Mass.
Malleefold	Malleable crease display material	Waldorf Paper Products Co., St. Paul, Minn.
Manco	Counters	Maxson Automatic Machinery Co., Westerly, R. I.
Manhattan	Paper food containers	Stevens & Thompson Paper Co., Greenwich, N. Y.
Maralux	Bags for hygroscopic products	Marathon Corp., Menasha, Wis.
Marapak	Bags and liners for frozen food packages	Marathon Corp., Menasha, Wis.
Marble-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Marblette	Phenol-formaldehyde cast and liquid resins	Marblette Corp., Long Island City, N. Y.
Marco	Leather grain paper	The Marvellum Co., Holyoke, Mass.
Markem	Printing machines	Markem Machine Co., Keene, N. H.
Market Paper	Meat wrapping paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Markomatic	Marking machines, marking attachments	Adolph Gottscho, Inc., New York, N. Y.
Master	Infolding diagonal gluing machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Master, The	Fibre shipping drums	The Master Package Corp., Owen, Wis.
Masterbuilt	Candy boxes	F. J. Schleicher Paper Box Co., St. Louis, Mo.
Mastercraft	All Ben Mont products	Ben Mont Papers, Inc., Bennington, Vt.
Mastercraft	Leatherette boxes and displays	Harlich Mfg. Co., Mastercraft Div., Chicago, Ill.
Master Prints	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Master Ray	Metal surfaced counter and window displays	Reynolds Metals Co., Richmond, Va.
Masterwrap	Interfolded waxed tissue	Rhinelander Paper Co., Rhinelander, Wis.
Matador	Paper bag machines	H. H. Heinrich, Inc., New York, N. Y.
Mat-A-Labels	Metal labels	L. F. Grammes & Sons, Inc., Allentown, Pa.
Match-Box	Kit for matching colors	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Mayflower	Paper drinking cups	American Paper Goods Co., Kensington, Conn.
Mazola	Soluble extract of the protein in corn	Corn Products Refining Co., New York, N. Y.
Measure Scoop	Bag filling device	Milprint, Inc., Milwaukee, Wis.
Megatherm	High-frequecny electronic sterilization equipment	Federal Telephone & Radio Corp., Newark, N. J.
Melco	Decorated metal containers	Seymour Products Co., Seymour, Conn.
Melmac	Melamine-formaldehyde molding material and adhesives	American Cyanamid Co., Plastics Div., New York, N. Y.
Melody Print	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Melurac	Melamine, urea adhesive	American Cyanamid Co., Plastics Div., New York, N. Y.
Menasha	Paraffined cartons and papers	Marathon Corp., Menasha, Wis.
Mercury	Closure	Owens-Illinois Glass Co., Toledo, O.
Mercury	Carton gluer	E. G. Staude Mfg. Co., St. Paul, Minn.
Mercury	Vignette for labels	The U. S. Printing & Lithograph Co., Cincinnati (Norwood), O.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Meshtex	Fluted paper cemented to cotton web, for wrapping and concrete curing mats	Fulton Bag & Cotton Mills, Atlanta, Ga.
Metacel	Metal foil tape	Industrial Tape Corp., New Brunswick, N. J.
Met-A-Labels	Metal labels	L. F. Grammes & Sons, Inc., Allentown, Pa.
Met-A-Lac	Imitation foil	Paper Affiliates, Dept. Nalco, Inc., New York, N. Y.
Metal-Art	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Metal Art Plaid	Box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Metal Edge	Reinforced paper boxes	National Metal Edge Box Co., Phila., Pa.
Metalflex	Flexible hot glue	National Adhesives, New York, N. Y.
Metal Lac	Metal printed and embossed friction glazed papers and boards	Keller-Dorian Corp., New York, N. Y.
Metalglass	Metallic coated glassine	Hartford City Paper Co., Hartford City, Ind.
Metaline	Printed embossed paper	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Metallic	Pyroxylin coated metallic papers	Hazen Paper Co., Holyoke, Mass.
Metaloid	Embossed signs and boxes and plaques	Chaspec Mfg. Co., Inc., New York, N. Y.
Metaloid	Pyroxylin coated paper	The Plastic Coating Corp., Holyoke, Mass.
Metalour	Gold and silver papers	The Marvellum Co., Holyoke, Mass.
Metal Seal	Foil and imitation foil	Bradner Smith & Co., Chicago, Ill.
Metaltite	Flat gummed paper	The Gummed Products Co., Troy, O.
Metaltone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Metalustre	Metallic lacquer enamels	Maas & Waldstein Co., Newark, N. J.
Metex	Gold or silver cellulose acetate	E. L. Cournand, Inc., New York, N. Y.
Methocel	Dow methyl cellulose	The Dow Chemical Co., Midland, Mich.
Metlak	Metallic inks	Pope & Gray, Inc., New York, N. Y.
Metso	Cleansers	Philadelphia Quartz Co., Phila., Pa.
Mezzotint	Printed and embossed metallic coated papers and boards	Keller-Dorian Corp., New York, N. Y.
Mic	Molded plastics	Molded Insulation Co., Phila., Pa.
Micacrystal	Crinkled cellophane	Aldine Paper Co., New York, N. Y.
Michcote	Super white boxboard	Michigan Carton Co., Battle Creek, Mich
Midget	Static eliminator	The Simco Co., Phila., Pa.
Midget	Wire staples	Acme Staple Co., Camden, N. J.
Midget	Labeling machines and accessories	The Liquid Carbonic Corp., Chicago, Ill.
Mikah	Glues and pastes, gums, lacquers	National Adhesives, New York, N. Y.
Milbossed	Embossed wood top corks	Dodge Cork Co., Inc., Lancaster, Pa.
Milgate	Coated paper and board products	E. W. Twitchell, Inc., Packaging Div., Phila., Pa.
Millbridge	General	Springfield Coated Paper Corp., Camden, N. J.
Miller	Package and bundle wrapping machines	Miller Wrapping & Sealing Machine Co., Chicago Ill
Millsplastic	Extruded saran	Elmer E. Mills Corp., Chicago, Ill.
Mil-O-Bands	Thermoplastic sausage bands	Milprint Inc., Milwaukee, Wis.
Mil-O-Seal	Pliofilm encasing cooked meat loaves	Milprint Inc., Milwaukee, Wis.
Milparch	Greaseproof parchment paper, grease resistant	Miller & Miller, Atlanta, Ga.
Milwaukee	Aniline printing press and bronzing machines	C. B. Henschel Mfg. Co., Milwaukee, Wis.
Mirette	Box paper	Kupfer Bros. Co., New York, N. Y.
Mirofoil	Imitation foil papers	Marvellum Co., Holyoke, Mass.
Mirolite	Transparent thermoplastic papers	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Mirodescent	Box papers	Hazen Paper Co., Holyoke, Mass.
Miroflex	Flexible hot glue	National Adhesives, New York, N. Y.
Mirror Flints	Glazed flint	Louis Dejonge & Co., New York, N. Y.
Modern Clipper	Automatic bag-making machine	Modern Containers, Inc., Los Angeles, Calif.
Modeme Dull Antique	Clay coated paper	Bradner Smith & Co., Chicago, Ill.
Modern Union	Metal displays	Union Steel Products Co., Albion, Mich.
Moistite	Moisture resistant boxboard	Waldorf Paper Products Co., St. Paul, Minn.
Moist Proof	Set-up paper cigar boxes	Consolidated Box Co., Inc., Tampa, Fla.
Moist-R-Proof	Bags, tubes, liners, molded fibre shipping containers	Moist-R-Proof Container Co., San Francisco, Calif.
Molloy-Made	Imitation leather containers	The S. K. Smith Co., Chicago, Ill.
Monarch	Fillers	The Liquid Carbonic Corp., Chicago, Ill.
Monarch	Right angle folding box gluer	E. G. Staude Mfg. Co., St. Paul, Minn.
Monocell	Filter	Karl Kiefer Machine Co., Cincinnati, O.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Mono Kleen Kups	Paraffined containers	Mono Service Co., Newark, N. J.
Mono-Pak	Collapsible tubes for single use	A. H. Wirz, Inc., Chester, Pa.
Mono-Piston	Filling machine for viscous materials	Karl Kiefer Machine Co., Cincinnati, O.
Monoscale	Can filling machine	Karl Kiefer Machine Co., Cincinnati, O.
Mono Spout	Spout fitting	Continental Can Co., New York, N. Y.
Monotite	Laminated paper	Nashua Gummed & Coated Paper Co., Nashua, N. H.
Morpac	Butter print forming, wrapping and cartoning machine	Lynch Mfg. Corp., Defiance, O.
Morr Glos	Gloss ink	Geo. H. Morrill Co., Div. General Printing Ink Corp., New York, N. Y.
Morris	Box closing lock	Robertson Paper Box Co., Inc., Montville, Conn.
Morrison	Wire stitchers	Harris - Seybold - Potter Co., Seybold Div., Dayton, O.
Morrow-Stevens	Wrapping and sealing machines	Maxson Automatic Machinery Co., Westerly, R. I.
Mosaic Parquetry	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Moto-Air	Pump for vacuum and pressure	New Jersey Machine Corp., Hoboken, N. J.
Multi	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Multitite	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Multitone	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Multiwax	Petroleum wax	Petroleum Specialties, Inc., New York, N. Y.
Mural	Fancy waterproof box paper	The Marvellum Co., Holyoke, Mass.
Myers Labelstik	Seamless metal boxes	George D. Ellis & Sons, Inc., Myers Mfg. Div., Phila., Pa.
Myracol	Cartons	Container Corp. of America, Chicago, Ill.

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Nafomatic	Folding paper box	National Folding Box Co., New Haven, Conn.
Nanking	Chinese papers	Stevens, Nelson Paper Corp., New York, N. Y.
Napcones	Displays	The National Process Co., New York, N. Y.
Napconstruction	Unmounted displays	The National Process Co., New York, N. Y.
Nap grippe	Displays	The National Process Co., New York, N. Y.
Natco	Asphalt laminated paper	National Water-Proofing Co., Camden, N. J.
National	Labeling machines and accessories	The Liquid Carbonic Corp., Chicago, Ill.
National	Adhesives (all types)	National Adhesives, New York, N. Y.
National	Food products metal bags	Reynolds Metals Co., Richmond, Va.
National	Packaging machinery	U. S. Automatic Box Machinery Co., Inc., Roslindale, Boston, Mass.
National Sealer	Tape moistening machine	Nashua Package Sealing Co., Nashua, N. H.
Needlekraft	Paper for box coverings	Pejepscot Paper Co., New York, N. Y.
Nellite	Phenol-formaldehyde molding powder	The Watertown Mfg. Co., Watertown, Conn.
Neocell	Cellulose vials, containers and specialties	Celluplastic Corp., Newark, N. J.
Neo-Classic	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Nestcup	Nesting container	Sutherland Paper Co., Kalamazoo, Mich.
Nestrite	Heavy-duty round nested paper container	Lily-Tulip Cup Corp., New York, N. Y.
Nestyle	Nested type container	The Sealright Co., Inc., Fulton, N. Y.
Neutraglas	Chemically resistant glass	Kimble Glass Co., Vineland, N. J.
Neventop	Carton filling and sealing machine	Stokes & Smith Co., Phila., Pa.
Newman Seal	Circular compounded crimped closure	Continental Can Co., New York, N. Y.
New Perfection	Dropping outfits	Pennsylvania Glass Products Co., Pittsburgh, Pa.
New-Way	Labeling and casing equipment	Chisholm-Ryder Co., Inc., New Way Div., Hanover, Pa.
Niagara Wire Stitcher	Wire stitching and stapling machine	Paslode Co., Chicago, Ill.
Nicro-Steel	Casters	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Niles	Shipping containers, metal drums	Republic Steel Corp., Cleveland, O.
Nitron	Cellulose nitrate	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Nixonite	Cellulose acetate (sheets, rods and tubes)	Nixon Nitration Works, Nixon, N. J.
Nixonite M.P.	Cellulose acetate molding powder	Nixon Nitration Works, Nixon, N. J.
Nixonoid	Cellulose nitrate (pyroxylin)	Nixon Nitration Works, Nixon, N. J.
Nojax	Cellulose meat casings	The Visking Corp., Chicago, Ill.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
No-Kap	Closures	No-Kap Closures (U.S.A.), Inc., Providence, R. I.
No-Kap	Collapsible tubes	National Collapsible Tube Co., Providence, R. I.
No-Lap	Abrasive bands and sleeves	The Cleveland Container Co. Cleveland, O.
Nolox	Knock-down paper box	American Box Board Co., Grand Rapids, Mich.
Nolox	Garment boxes	Morris Paper Mills, Chicago, Ill.
Nolox	Special automatic quick set folding boxes	Pollock Paper & Box Co., Dallas, Texas.
Nolox	Double corner folding boxes	Spear Box Co., Inc., New York.
No-Lox	Folding carton	Robert Gair Co., Inc., New York, N. Y.
Non-Scratch	Printing inks	The Braden Sutphin Ink Co., Cleveland, O.
Non-Scuff	Liner board on corrugated boxes	F. J. Kress Box Co., Pittsburgh, Pa.
Non-Warp Glue	Flexible hot glue	National Adhesives, New York, N. Y.
Norbutus	Pyroxylin coated metallic papers in brilliant colors	Hazen Paper Co., Holyoke, Mass.
Norloc	Molded plastic packages	Norton Laboratories, Inc., Lockport, N. Y.
No Sol Vit	Alkali free serum containers	T. C. Wheaton Co., Millville, N. J.
No Tarnish	Metal tarnish preventative	Cleaveland Lab. & Mfg. Co. Inc., Peapack, N. J.
Nover	Decalcomania label	Paim, Fechteler & Co., New York, N. Y.
Nub-Linen	Fancy printed	Louis Dejonge & Co., New York, N. Y.
Nu-Craft	Display, corrugated	Sherman Paper Products Corp. Newton Upper Falls, Mass.
Nu-Curve	Corrugated display material	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Nugget	Cover paper	United Mfg. Co., Springfield, Mass.
Nu-Glas	Glass tumblers, jars and bottles	Anchor Hocking Glass Corp., Lancaster, O.
NuGlaze	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Nu-Hide	Box cover paper	Matthias Paper Corp., Phila., Pa.
NuMat	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Nu-Trim	Corrugated display material	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Nuvohack	Folding paper box	Everett Young Co., Providence, R. I.
Nuvopak	Preformed and prewrapped collapsible containers	Cambridge Paper Box Co., Cambridge, Mass.

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O. & J.	Labeling machines and accessories	Liquid Carbonic Corp., Chicago, Ill.
Obaco	Folding paper box	National Folding Box Co., New Haven, Conn.
Oilex	Facsimile oil paintings	Chaspec Mfg. Co., New York.
Oldelace	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Old Tavern	Gold and platinum box coverings	McLaurin-Jones Co., Brookfield, Mass.
Oliver	Wrapping and labelling equipment	Oliver Machinery Co., Grand Rapids, Mich.
One-A-Time	Pill dispensing box	National Folding Box Co., New Haven, Conn.
Onized	Containers	Owens-Illinois Glass Co., Toledo, O.
On-to-sta	Gummed tapes and cambrics	Atlantic Gummed Paper Corp., Bklyn, N. Y.
Opalite	Cast phenolic semi-transparent	Catalin Corp., New York, N. Y.
Opalon	Cast phenolic plastics	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Orientone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Orpco	Corrugated boxes and displays	Ottawa River Paper Co., Toledo, O.
Outserts	Package advertising for the outside of containers	Outserts, Inc., New York, N. Y.
Overseal	Bottle closure	Aluminum Seal Co., New Kensington, Pa.
Owens	Druggists glassware	Owens-Illinois Glass Co., Toledo, O.

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PV Film	Polyvinyl alcohol film	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Pacemaker	Gumming machine	New Jersey Machine Corp., Hoboken, N. J.
Pacer	Heat sealing devices	Heat Seal-It Co., Phila., Pa.
Packer	Sealing tape machine	Better Packages, Inc., Shelton, Conn.
Packette	Utility bags	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Packomatic	Packaging machinery	J. L. Ferguson Co., Joliet, Ill.
Packomatic Chief	6-in-line net wt. scale	J. L. Ferguson Co. Joliet, Ill.
Packrette	Box paper	Kupfer Bros. Co., New York.
Pack-Rite	Heat-sealers	Pack-Rite Machines, Milwaukee, Wis.
Pac-Kups	Paper containers	Dixie-Cup Co., Easton, Pa.
Paco-Lac	Pyroxylin coated paper	Paper Affiliates, Dept. Nalco, Inc., New York, N. Y.
Pac-Pruf	Water- and oil-proof papers	Cromwell Paper Co., Chicago, Ill.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Pacquette	Cellophane bag	Thomas M. Royal & Co., Phila., Pa.
Padinol	Flexible adhesive	The Fales Chemical Co., Inc., Cornwall Landing, N. Y.
Padocel	Padding paper	Geo. H. Sweetnam, Inc., Cambridge, Mass.
Padox	Box top padding	Union Wadding Co., Pawtucket, R. I.
Padsit	Padding paper	Geo. H. Sweetnam, Inc., Cambridge, Mass.
Pads-It	Cold process padding gum	The Commercial Paste Co., Columbus, O.
Pals-Flex	Flexible adhesives	Paisley Products, Inc., Chicago, Ill.
Paisley	General line adhesives	Paisley Products, Inc., Chicago, Ill.
Paisley Spray	Solution for non-offset spray guns	Paisley Products, Inc., Chicago, Ill.
Paisol	Envelope gum additive	Paisley Products, Inc., Chicago, Ill.
Paistex	Latex base adhesives	Paisley Products, Inc., Chicago, Ill.
Paistick	Cook-up paste powder	Paisley Products, Inc., Chicago, Ill.
Paker Bulkan	For bulk shipments, up to 30 lbs.	Sealright Co., Inc., Fulton, N. Y.
Pakerkan	Frozen foods container (bulk)	The Sealright Co., Inc., Fulton, N. Y.
Pak King	Filling machine	Weigh Right Automatic Scale Co., Joliet, Ill.
Pak-Saks	Frozen and dehydrated food containers	Thomas M. Royal & Co., Phila., Pa.
Paktite	Light-duty pleated round nested paper container	Lily-Tulip Cup Corp., New York, N. Y.
Palmetto	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Palmlac	Window display signs	The Palm Bros. Decalcomania Co., Cincinnati, O.
Pamilla	Silver polishing cloth	The Gorham Co., Providence, R. I.
Panasteel	Laminated paper liner	General Felt Products, Inc., Bklyn, N. Y.
Paperglos	Glassine paper	Westfield River Paper Co., Russell, Mass.
Papricloth	Treated parchment	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Parafene	Super-transparent, glassine, lacquered paper	Paramount Paper Products Co., Inc., Phila., Pa.
Paragon	Two-piece caps	Anchor Hocking Glass Corp., Lancaster, O.
Paragon	Hand numbering machines	Wm. A. Force & Co., Inc., Bklyn., N. Y.
Parakote	Moistureproof coated packaging papers	Marathon Corp., Menasha, Wis.
Paramount	General	Paramount Paper Products Co., Inc., Phila., Pa.
Paraply	Moistureproof and greaseproof laminated cartons	Marathon Corp., Menasha, Wis.
Para-Shield	Thermoplastic coatings for bottle sealing	Paragon Plastics, Inc., Seattle, Wash.
Para-Ware	Plastic containers and tableware	Paragon Plastics, Inc., Seattle, Wash.
Parawax	Preprint waxed bags	Paramount Paper Products Co., Inc., Phila., Pa.
Parchkin	Vegetable parchment for art printing	Paterson Parchment Paper Co., Bristol, Pa.
Parchstone	Greaseproof innerwrap	Rhinelander Paper Co., Rhinelander, Wis.
Parkay	Woodgrain box papers	Hazen Paper Co., Holyoke, Mass.
Parkwood	Impregnated wood plastic material	Parkwood Corp., Wakefield, Mass.
Parquet	Wood grain (imitation) box covers	District of Columbia Paper Mills, Inc., Washington, D. C.
Parquette	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Parry	Paper box machinery	Samuel R. Parry Mach. Co., Inc., Rochester, N. Y.
Pastel Creations	Paper for box coverings	Pejepscot Paper Co., New York, N. Y.
Patapake	White paper for printing and packaging	Paterson Parchment Paper Co., Bristol, Pa.
Patapar	Genuine vegetable parchment	Paterson Parchment Paper Co., Bristol, Pa.
Patawite	A 9-lb. manifold	Paterson Parchment Paper Co., Bristol, Pa.
Pexwell	Padding	American Lace Paper Co., Milwaukee, Wis.
Peak-O-Net	Cotton bags	American National Bag & Burlap Co., Inc., Bklyn, N. Y.
Pearl	Micro-crystalline wax	Petrolite Corp., Wax Div., New York, N. Y.
Pedigree	Line of protective coatings	The P. D. George Co., St. Louis, Mo.
Pee Gee	Reducing and non-scratch ink compounds	Pope & Gray, Inc., New York, N. Y.
Peel-Pail	Ice cream pail	Bloomer Bros., Co., Newark, New York State
Peerless	Stamping presses, roll leaf	Peerless Roll Leaf Co., Inc., Union City, N. J.
Peerless	Infolding gluing machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Peerless	Straight line vacuum fillers	U. S. Bottlers Machinery Co., Chicago, Ill.
Pellette	Box paper	Kupfer Bros. Co., New York, N. Y.
Penargette	Box paper	Kupfer Bros. Co., New York.
Penescope	Penetration tester	Thwing-Albert Instrument Co., Phila., Pa.
Perfect Circle Plates	Engravings	Champlain Co., Inc., New York, N. Y.
Perfection	Box covering papers	Royal Paper Corp., New York.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Perfect-O-Cut	Embossed labels and seals	The Tablet & Ticket Co., Chicago, Ill.
Perfecto-Pac	Pie bands	Milprint, Inc., Milwaukee, Wis.
Permacel	Paper pressure sensitive tape	Industrial Tape Corp., New Brunswick, N. J.
Permaflex	Glue	The F. G. Findley Co., Milwaukee, Wis.
Perma-Stic	Dextrine label gum	National Adhesives, New York, N. Y.
Permolene	Pigmented aniline inks	Hill-Hentschel Co., St. Louis, Mo.
Petite Moire	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Petrocote	Asphalt coated paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Phantom	Embossed box papers	Hazen Paper Co., Holyoke, Mass.
Phantom-Lite	Displays with flashers	Reynolds Metals Co., Richmond, Va.
Phen-Cote	Can liner coating	Watson-Standard Co., Pittsburgh, Pa.
Phenix	Glass bottles	Armstrong Cork Co., Lancaster, Pa.
Phoenix	Band cap Cone top can	Phoenix Metal Cap Co., Chicago, Ill.
Photomailer	Mailing envelopes	Hinde & Dauch Paper Co., Sandusky, O.
Pick-ets	Glue	The F. G. Findley Co., Milwaukee, Wis.
Pie-Pak	Container for pies	Pie-Pak Co., Inc., Hoboken, N. J.
Pier forms	Paper and fibre tubes	Beacon Container Co., New York, N. Y.
Pilfer-Proof	Bottle closure	Aluminum Seal Co., New Kensington, Pa.
Pin Stripes	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Pintex	Printed box paper	The Marvellum Co., Holyoke, Mass.
Pique	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Pique Embossed	Box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Plaid Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
PlainLid	Ointment boxes	Columbia Specialty Co., Inc., Baltimore, Md.
Planet	Sealing tapes	McLaurin-Jones Co., Brookfield, Mass.
Plaskon	Urea formaldehyde molding compound	Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, O.
Plastacele	Cellulose acetate sheeting and molding powder	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Plastek	Color printed and embossed friction glazed papers and boards	Keller-Dorian Corp., New York, N. Y.
Plasticap	Molded caps	Anchor Hocking Glass Corp., Lancaster, O.
Plastic Basket	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Plasticolor	Cellulose laminated cover paper	The Dobeckmun Co., Cleveland, O.
Plasticote	Plastic nameplates and signs	Foxon Co., Providence, R. I.
Plastik Foil	Roll leaf for plastics	Peerless Roll Leaf Co., Union City, N. J.
Plast-O-Dip	Heating and dipping tank for strip coating	Aeroil Burner Co., W. New York, N. J.
Plateglassine	Bleached glassine	Deerfield Glassine Co., Monroe Bridge, Mass.
Platelustre	Transparent colored lacquers	Maas & Waldstein Co., Newark, N. J.
Plexiglas	Transparent acrylic plastic sheets and molding compounds	Rohm & Haas Co., Phila., Pa.
Plia	Combining gum for fabrics	Stein, Hall & Co., Inc., New York, N. Y.
Pliastic	Resin emulsion adhesives	Paisley Products, Inc., Chicago, Ill.
Pliatab	Padding adhesive	Paisley Products, Inc., Chicago, Ill.
Pli-Cote	Metal coater	Watson-Standard Co., Pittsburgh, Pa.
Pli-Fast	Sealing tapes	Rexford Paper Co., Milwaukee, Wis.
Pliofilm	Pliofilm ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Pliobond	Adhesive	The Goodyear Tire & Rubber Co., Akron, O.
Pliofilm	Transparent rubber-hydrochloride film	The Goodyear Tire & Rubber Co., Akron, O.
Plioflex	Hot flexible glue	Arvey Corp., Jersey City, N. J.
Pliolite	Liquid protective coating	The Goodyear Tire & Rubber Co., Akron, O.
Plio-Ribbon	Printed pliofilm ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Pliosuede	Velour pliofilm	Cellusuede Products, Inc., Rockford, Ill.
Plio-Tye	Plastic coated material made of pliofilm	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Pliowax	Wax, coating and sealing	The Goodyear Tire & Rubber Co., Akron, O.
Plyglass	Multi-ply laminated glassine	Deerfield Glassine Co., Monroe Bridge, Mass.
Ply-Metal	Foil containers	Reynolds Metals Co., Richmond, Va.
Plymouth	Paper drinking cups	The American Paper Goods Co., Kensington, Conn.
Pocono	Box cover paper	Matthias Paper Corp., Phila., Pa.
Polymerin	Speed-bake enamel finish	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Polymex	Baking enamel for low temperature treatment	Ault & Wiborg Div., Interchemical Corp., New York, N. Y.
Pomona	Fruit and vegetable wrappers (tissue)	Fernstrom Paper Mills, Inc., Pomona, Calif.
Pony Gummer	Small table gummer	New Jersey Machine Corp., Hoboken, N. J.
Pony Labelrite	Midget labeling machine	New Jersey Machine Corp., Hoboken, N. J.
Popular Priced	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Porcell	Paper drinking cup	American Lace Paper Co., Milwaukee, Wis.
Porthos	Cover paper	United Mfg. Co., Springfield, Mass.
Port Low	Portable gravity sections	The Alvey-Ferguson Co., Cincinnati, O.
Postage Meter	Paper sealing tape	Gummed Tape & Devices Co., Bklyn, N. Y.
Postalett	Pocket letter scales	The Exact Weight Scale Co., Columbus, O.
Pour-Aid	Liquor pourer	Lanfare Molded Products, Toledo, O.
Pour-N-Seal	Initial and re-sealing cap with lever and pouring spout	Continental Can Co., New York, N. Y. The Crown Cork & Seal Co., Baltimore, Md. Williams Sealing Corp., Decatur, Ill.
Pouring-Pull	Milk bottle cap	Sealright Co., Inc., Fulton, N. Y.
Powrweld	Foot power bag crimper	Cleveland Crimping Press Co., Cleveland, O.
Prac-Decal	Truck signs and lettering	The Meyercord Co., Chicago, Ill.
Precision	Medicinal droppers	Pennsylvania Glass Products Co., Pittsburgh, Pa.
Prepak	Corrugated boxes	The Hinde & Dauch Paper Co., Sandusky, O.
Pres-A-Ply	Pressure sensitive labels	Dennison Mfg. Co., Framingham, Mass.
Presslt	Liquid dispensers	The Food Dispenser Co., Hartford, Conn.
Prestmark	Embossed paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Presto	Box and label printing machines	Marken Machine Co., Keene, N. H.
Presto	Home canning jars	Owens-Illinois Glass Co., Toledo, O.
Prestomark	Heat applied labels	Kaumagraph Co., Wilmington, Del.
Price It	Stock design cellophane bags	Milprint, Inc., Milwaukee, Wis.
Print-Ad-String	Cotton tape	Chicago Printed String Co., Chicago, Ill.
Print-o-Wrap	Cellophane sheets and rolls	Oneida Paper Prods., Inc., New York, N. Y.; also Continental Bag Specialties Corp., New York, N. Y.
Printcolor	Process for dyeing all forms of Cellulose Acetate and Acetate Butyrate (Tenite II)	Printloid, Inc., New York, N. Y.
Print-Cote	Protective overprint for coating printed sheets of cellulose acetate	Printloid, Inc., New York, N. Y.
Printcraft	Printed wrappings	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Printloid	Transparent containers	Printloid, Inc., New York, N. Y.
Print-O	Waxed wrapping paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Printweigh	Weight printing scales	Toledo Scale Co., Toledo, O.
Pris-O-Matic	Easy loading "Cellophane" bags	The Dobeckmun Co., Cleveland, O.
Producer	Wrappers	Gellman Mfg. Co., Rock Island, Ill.
Progressive-Net	Open mesh bags for produce	Progressive Bag Co., Inc., New Haven, Conn.
Pro-plastik	Plastic displays	Process Displays, Inc., Milwaukee, Wis.
Pro-Lac	Decalcomania transfers	Process Displays, Inc., Milwaukee, Wis.
Prosperity	Meat wrapping paper	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Protectall	Fibreboard and corrugated board boxes	Container Corp. of America, Chicago, Ill.
Protection-Plus	Special bags for food and chemicals	Equitable Paper Bag Co., Inc., Long Island City, N. Y.
Protectopac	Specialty wraps	Milprint, Inc., Milwaukee, Wis.
Protek-Coat	Asphalt compound for moisture barriers	The Davison Chemical Corp., Baltimore, Md.
Protek-Seal	Asphalt compound	The Davison Chemical Corp., Baltimore, Md.
Protek-Sorb	Silica gel dehydrating agent	The Davison Chemical Corp., Baltimore, Md.
Protektar	Moth-repellent paper	Central States Paper & Bag Co., St. Louis, Mo.
Protektol	Transparent stripping lacquer	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Protek	Padding	American Lace Paper Co., Milwaukee, Wis.
Protinol	Label adhesive	The Fales Chemical Co., Inc., Cornwall Landing, N. Y.
Proxmelt	Coatings and adhesives	Pyroxylin Products, Inc., Chicago, Ill.
Proxmesh	Closed mesh fabrics	Pyroxylin Products, Inc., Chicago, Ill.
Prystal	Clear cast phenolic plastic	Catalin Corp., New York, N. Y.
Pure-Cone	Paper bottle	Sutherland Paper Co., Kalamazoo, Mich.
Pure Pail	Ice cream package	Bloomer Bros. Co., Newark, Wayne Co., New York State
Pure Pak	Milk containers	Fibreboard Prods., Inc., San Francisco, Calif.
Pure Pak	Milk blanks	Gardner-Richardson Co., Middletown, O.
Pure-Pak	Paper milk containers	American Paper Bottle Co., Toledo, O.
Pure-Pak	Machine for fabricating, filling and sealing paper milk bottles	Ex-Cello Corp., Detroit, Mich.
Pure-Pak	Milk containers	Single Service Containers' Inc., New York, N. Y.
Pure-Pak	Non-toxic paste	National Adhesives, New York, N. Y.
Puritan	Round cups, food packs	The American Paper Goods Co., Kensington, Conn.
Puritan	Milk blanks	Gardner-Richardson Co., Middletown, O.
Puro Pak	Poultry box lining waxed paper	Central Waxed Paper Co., Chicago, Ill.
Purse Kit	Cosmetic kit	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Pyralin	Cellulose nitrate (pyroxylin)	E. I. du Pont de Nemours & Co. Inc., Wilmington, Del.
Pyralon	Box paper	Marvellum Co., Holyoke, Mass.
Pyrette	Box paper	Kupfer Bros. Co., New York, N. Y.
Pyrex	Serum bottles, laboratory and pharmaceutical glassware	Corning Glass Works, Corning, N. Y.
Pyrodescent	Iridescent or pearl papers	Pyrotex Leather Co., Leominster, Mass.
Pyro-Seal	Pyroxylin coated paper	Bradner Smith & Co., Chicago, Ill.
Pyro Sheen	Pyroxylin coated papers	Pyrotex Leather Co., Leominster, Mass.
Pyroxcote	Lacquer and protective coatings	Pyroxylin Products, Inc., Chicago, Ill.
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Q.E.D.	Bottle label gum	F. G. Findley Co., Milwaukee, Wis.
Quik-Fold	Folding carton	Old Dominion Box Co., Lynchburg, Va.
Quadrimatic	Transparent bag of exceptional strength	The Dobeckmun Co., Cleveland, O.
Quality Cheviot	Box cover papers	Pejepscot Paper Co., Inc., New York, N. Y.
Quick	Printing inks, lithographic supplies	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Quick Pac	Cracker caddy	Robert Gair Co., Inc., New York, N. Y.
Quick-Set Compound	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Quality Cloud	Box cover papers	Pejepscot Paper Co., Inc., New York, N. Y.
Quikseal	Closure	Owens-Illinois Glass Co., Toledo, O.
Quik-Set	Folding carton	Robert Gair Co., Inc., New York, N. Y.
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R.C.Chipboard	Super finish chip board	The Butterfield-Barry Co., New York, N. Y.
R-70	Rigid transparent fabricating machine	Taber Instrument Corp., N. Tonawanda, N. Y.
R.T.G.	Folding cartons and displays	The Richardson Taylor-Globe Corp., Cincinnati, O.
R-V-Food	Frozen food cartons	Arvey Corp., Jersey City, N. J.
R-V-Lite	Transparent window material	Arvey Corp., Jersey City, N. J.
R-V Seal	Adhesives	Arvey Corp., Jersey City, N. J.
Radiant	Embossed paper—not coated	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Rainbow	Paper for box coverings	Pejepscot Paper Co., New York, N. Y.
Rainbow	Flint paper	Bradner Smith & Co., Chicago, Ill.
Rainbow	Reinforced cellophane bags	The Munson Bag Co., Cleveland, O.
Rainbow	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Rajahgrey	High strength fibreboard	The Rogers Paper Mfg. Co., Manchester, Mass.
Raltex Protexal	Reinforced waterproof paper	W. Ralston & Co., Inc., Niagara Falls, N. Y.
Rapid Power Boosters	Power-driven belt stackers	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Rapidwheel	Gravity conveyors	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Rarewood	Woodgrain box papers	Hazen Paper Co, Holyoke, Mass.
Raycote	Rayon flock	Rayon Processing Co. of R. I., Central Falls, R. I.
Raymix	Rayon flock	Rayon Processing Co. of R. I., Central Falls, R. I.
Rayette	Box paper	Kupfer Bros. Co., New York, N. Y.
Rayon	Mica coated paper	Marvellum Co., Holyoke, Mass.
Rayon-Bow	Rayon ties	Fibre Cord Co., New York, N. Y.
Ray-Rib	Rayon ribbons and ties	Fibre Cord Co., New York, N. Y.
Real	Greaseproof	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Really Fla	Gummed papers	Mid-States Gummed Paper Co., Chicago, Ill.
Red Core	Gummed paper tape	Rexford Paper Co., Milwaukee, Wis.
Red Diamond	Automatic labeling machine	The Liquid Carbonic Corp., Chicago, Ill.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Reddiwrap	Greaseproof wrap for liners, etc.	Riegel Paper Corp., New York, N. Y.
Red Stripe	Extra heavy box cambric	Rexford Paper Co., Milwaukee, Wis.
Red Tye	Mailing bags	Chase Bag Co., Chicago, Ill.
Reel-Hide	Box cover paper	Matthias Paper Corp., Phila., Pa.
Reel-Pak	Fibre film boxes	Gaylord Container Corp., St. Louis, Mo.
Reflectone	Flint glazed papers	Wyomissing Glazed Paper Co., Reading, Pa.
Reilly Indur	Molding powders & phenol-formaldehyde resins, etc.	Reilly Tar & Chemical Corp., Indianapolis, Ind.
Reindeer	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Renaissance	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Renicote	Metallic printing stock for box covering	Reynolds Metals Co., Richmond, Va.
Repaco	Wrappers—indented inner and outer wraps	The Republic Paperboard Co., Cincinnati, O.
Re-Pel	Paper, water repellent	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Repelall	Greaseproof paper	Hazen Paper Co., Holyoke, Mass.
Reptile	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Re-Seal-It	Re-sealing bottle caps	Reynolds Metals Co., Richmond, Va.
Resigum	Sizing adhesive	Paisley Products, Inc., Chicago, Ill.
Resimene	Cellulose-filled melamine formaldehyde	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Resinox	Phenol formaldehyde	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Resyn	Line of synthetic resin emulsions, lacquers, hot melts	National Adhesives, New York, N. Y.
Revelation	Cellophane bread wrappers	Milprint, Inc., Milwaukee, Wis.
Revolving Merchandiser	Electric turntables	Motion Displays, Inc., Bklyn, N. Y.
Rex	Conveyor	Chain Belt Co., Milwaukee, Wis.
Reyco	Metal bottleneck wraps	Reynolds Metals Co., Richmond, Va.
Reycraft	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Reycurv	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Reydec	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Reyflute	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Reytone	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Reytrim	Corrugated decorative display papers and boards	The Reyburn Mfg. Co., Inc., Phila., Pa.
Rezistol	Varnished liner paper	General Felt Products, Div. Standard Cap & Seal Corp., Bklyn, N. Y.
Rhomboid	Display carton	Robert Gair Co., Inc., New York, N. Y.
Ribbon and Pine	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Ribbonette	Cotton ribbon	Chicago Printed String Co., Chicago, Ill.
Rib-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Richleaf Gold and Platinum	Casein metallic coated papers	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Ridgelo	Clay coated boxboard and tag stock	Lowe Paper Co., Ridgefield, N. J.
Riegeline	Transparent glassine	Riegel Paper Corp., New York, N. Y.
Riegelite	Transparent waxed glassine	Riegel Paper Corp., New York, N. Y.
Rim Grip	Beaded tumbler caps	Swan Metal Cap Co., Inc., Chicago, Ill.
Rimseal	Closures	The Aridor Co., Chicago, Ill.
Ring-Seal Drum	Liquid holding fibre drum	Beacon Container Co., New York, N. Y.
Ripco	Greaseproof paper	Rhinelander Paper Co., Rhinelander, Wis.
Ripco Auto-Pak	Greaseproof innerwrap	Rhinelander Paper Co., Rhinelander, Wis.
Rip-Cord	Device for closing cotton and burlap bags	Bemis Bro. Bag Co., St. Louis, Mo.
Riplette	Box paper	Kupfer Bros. Co., New York, N. Y.
Ripple	Box cover	District of Columbia Paper Mills, Inc., Washington, D. C.
Ripplekraft	Non-waterproof crinkled wrapper	Angier Corp., Framingham, Mass.
Rippletone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Rippl'Tie	Ribbons	Chicago Printed String Co., Chicago, Ill.
Rite-Price	Stock printed cellophane bags	The Dobeckmun Co., Cleveland, O.
Rite-Seal	Liquid adhesive for cartons	Stein, Hall & Co., Inc., New York, N. Y.
Rite-Way	Bags and wrapping paper	Gaylord Container Corp., St. Louis, Mo.
Rockamarker	Hand marking devices	Adolph Gottscho, Inc., New York, N. Y.
Rockette	Box paper	Kupfer Bros. Co., New York, N. Y.
Rolamarker	Hand marking devices	Adolph Gottscho, Inc., New York, N. Y.
Roller Set	Roller marking and stenciling	Floquil Products, Inc., New York, N. Y.
Roll-Rite	Rolling pin	Owens-Illinois Glass Co., Toledo, O.
Rose	Display box	Morris Paper Mills, Chicago, Ill.
Rotary	Automatic labeler	Economic Machinery Co., Worcester, Mass.
Rotokits	Containers for spices, herbs and salts	Gutterson & Co., Inc., New York, N. Y.
Rotopeque	Printing process for transparent film	The Munson Bag Co., Cleveland, O.
Roto Prints	Metallic box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Rotoseal	Carton forming, lining, folding, closing, machine	Interstate Folding Box Co., Middletown, O.
Rovenseals—RO	Roll-on tamperproof over standard roll-on	Aluminum Seal Co., New Kensington, Pa.
Royal	Protective milk bottle hoods	Reynolds Metals Co., Richmond, Va.
Royal Satin	Quality newsboard for quality boxes	The Butterfield-Barry Co., Inc., New York, N. Y.
Royal Swan	Ribbons and ties	Stark Bros. Ribbon Co., New York, N. Y.
Royalgrey	High strength fibreboard	The Rogers Paper Mfg. Co., Manchester, Conn.
Rushtec	Imitation English grass paper	Paper Affiliates Co., Inc., New York, N. Y.
Rust Veto	Rust preventative compound	E. F. Houghton & Co., Phila., Pa.

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S Brand	Greaseproofing and moisture-resistant agent	Philadelphia Quartz Co., Phila., Pa.
S.K.S.	Flexible glue	Paisley Products, Inc., Chicago, Ill.
S & S	Filling, packaging machines	Stokes & Smith Co., Frankford, Phila., Pa.
SOS Compound	Printing ink compound	The Braden Sutphin Ink Co., Cleveland, O.
S T	Double shell caps	Phoenix Metal Cap Co., Chicago, Ill.
Safedge	Tumblers	Owens-Illinois Glass Co., Toledo, O.
Saf-Eg	Cushion bottom egg carton	Sutherland Paper Co., Kalamazoo, Mich.
Safe-Had	Steel stamp	Jas. H. Matthews & Co., Pittsburgh, Pa.
Safe Myx	Spray solution	Triangle Ink & Color Co., Inc., Bklyn, N. Y.
Safe Pack	Automatic egg carton	Grant Paper Box Co., Pittsburgh, Pa.
Safetex	Gummed paper sealing tape	Central Paper Co., Menasha, Wis.
Safetex	Carton for textile products	Shuttleworth Carton Co., Inc., New York, N. Y.
Safe-T-Seal	Sealing tape	Rexford Paper Co., Milwaukee, Wis.
Safety-Seal	Mailing boxes	W. H. Deisroth Co., Inc., Phila., Pa.
Safety Sealer	Closing machine (double seamer)	The Max Ams Machine Co., Bridgeport, Conn.
Safeway	Rolls of cellophane and cutters	Yorkville Paper Co., Inc., New York, N. Y.
Saflex	Safety glass plastic, vinyl acetal	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Saf-T-Lold	Transparent containers	Parfait Powder Puff Co., Chicago, Ill.
St. Albans	Colored design papers	Stevens, Nelson Paper Corp., New York, N. Y.
St. Valentine	Box paper	Kupfer Bros. Co., New York, N. Y.
Salem	Full color advertising folders	Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sales Appeal	All coated moistureproof bags	Paramount Paper Products Co., Inc., Phila., Pa.
Salespackage	Glass containers	Owens-Illinois Glass Co., Toledo, O.
Salvage Kraft	Obliterating former markings	Floquil Products, Inc., New York, N. Y.
Sandalwood	Imitation wood grain box covers	District of Columbia Paper Mills, Inc., Washington, D. C.
Sani-Glas	Processed sterilized prescription bottles	Brockway Glass Co., Inc., Brockway, Pa.
Saniseal	Milk and demijohn closure	Ferdinand Gutmann & Co., Bklyn, N. Y.
Sani-Sherm	Fluted liners	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Sanitair	High-speed automatic rotary air cleaner	U. S. Bottlers Machinery Co., Chicago, Ill.
Sanitape	Tablet packager	Ivers-Lee Co., Newark, N. J.
Sanitape-Sealite	Heat-sealed, unit packages of tablets, capsules, pills	Ivers-Lee Co., Newark, N. J.
Sani-Trete	Condiment dispensers	Imperial Molded Products Corp., Chicago, Ill.
Saran	Vinylidene chloride copolymer film	The Dow Chemical Co., Midland, Mich.
Saranac	Wire stitching machines	Saranac Machine Co., Benton Harbor, Mich.
Sara-Seal	Heat sealing machines	Say-Way Industries, Detroit, Mich.
Sateen	Mica embossed	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Satinettes	Box paper	Kupfer Bros. Co., New York, N. Y.
Satin-Glo	Display fabric	Columbus Coated Fabrics Corp., Columbus, O.
Satinteen	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Satintone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Satinwood	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Save-A-Seal	Closure	Owens-Illinois Glass Co., Toledo, O.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Saxolin	Open mesh bags	Chase Bag Co., Chicago, Ill.
Saxoliners	Box, bag and barrel liners	Chase Bag Co., Chicago, Ill.
Scientific	Filling machines	Scientific Filter Co., New York, N. Y.
Scotch	Cellulose tape, pressure sensitive	Minnesota Mining & Manufacturing Co., St. Paul, Minn.
Scotch fabrics	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Scotch Plaids	Paper for box coverings	Pejepscot Paper Co., New York, N. Y.
Scotchweave	Box covers	District of Columbia Paper Mills, Inc., Washington, D. C.
Scott	Net weighing and filling machines	U. S. Automatic Box Machinery Co., Inc., Roslindale, Boston, Mass.
Scuff-Proofed	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Scuf-Prof	Box cover paper	Matthias Paper Corp., Phila., Pa.
Scutan	Waterproof paper	Union Bag & Paper Corp., Scutan Div., New York, N. Y.
Seafoam	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Seal-All	Glue	The F. G. Findley Co., Milwaukee, Wis.
Seal Brand	Bags, boxes, liners	Disbrow Mfg. Co., Newark, N. J.
Seal Brand	Adhesives	Philadelphia Quartz Co., Phila., Pa.
Sealcone	Paper container	American Sealcone Corp., New York, N. Y.
Seal-Kap	Milk bottle caps	American Seal-Kap Corp., Long Island City, N. Y.
Se-Ali	Jars and bottles	Owens-Illinois Glass Co., Toledo, O.
Sealon	Hooded milk bottle closure	The Sealright Co., Inc., Fulton, N. Y.
Sealright	Protective paper containers	Sealright Co., Inc., Fulton, N. Y.
Seal-Spout	Pouring spout	Seal-Spout Corp., Newark, N. J.
Sealtight	Heat sealing machines	Heat Seal-It Co., Phila., Pa.
Sealtight	Bag closing machine	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Sealtite	Automatic bag filling and bag sealing machines	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Sealtite	Dry cold water-soluble glue	National Adhesives, New York, N. Y.
Sealtite-Unlwrap	Individual label attached package	Ivers-Lee Co., Newark, N. J.
Sealtonic	Wetting agent	Seal, Inc., Shelton, Conn.
Seal Top	Spouted closure	Plastic Engineering, Inc., Cleveland, O.
Seal-Tye	Combination pasted and metal tie closure	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Sealz	Hot melts	Dispersions Process, Inc., New York, N. Y.
Sebrof	Poster making process	The Forbes Lithograph Mfg. Co., Boston, Mass.
Secure-Seal	Metal screw closures	West Penn Mfg. & Supply Corp., Breckenbridge, Pa.
Security Stitcher	Wire stitching and stapling machine	Peslode Co., Chicago, Ill.
See-Thru	Rigid transparent containers and displays	Geo. V. Clark Co., Inc., Long Island City, N. Y.
Selectrol	Automatic checkweigher	The Exact Weight Scale Co., Columbus, O.
Self-Locking	Egg carton	Self-Locking Carton Co., Chicago, Ill.
Self Seal	Open end envelopes	U. S. Envelope Co., Springfield, Mass.
Sell-O-Face	Window bags and wraps	Thomas M. Royal & Co., Phila., Pa.
Sell-O-Royal	Transparent bags and envelopes	Thomas M. Royal & Co., Phila., Pa.
Selmor	Display stands	Hinde & Dauch Paper Co., Sandusky, O.
Semi-Seal	Cellophane glued to backboard	Milprint, Inc., Milwaukee, Wis.
Senior Krimper	Light weight jaw type krimper for bags	Peck-Rite Machine Corp., Milwaukee, Wis.
Sentry-Seal	Closure	Owens-Illinois Glass Co., Toledo, O.
Serpette	Box paper	Kupfer Bros. Co., New York, N. Y.
Servex	Waterproof duplex papers	Cincinnati Industries, Inc., Cincinnati (Lockland), O.
Servseal	Combination closure and dispenser	Guardian Safety Seal Co., Chicago, Ill.
Servitex	Imitation leather	Cincinnati Industries, Inc., Cincinnati (Lockland), O.
Seybold	Paper cutters	Harris - Seybold - Potter Co., Seybold Div., Dayton, O.
Seybold Precision	Die presses	Harris - Seybold - Potter Co., Seybold Div., Dayton, O.
Seymour	Decorated metal containers	Seymour Products Co., Seymour, Conn.
Shadotone	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Shadowgraph	Scales	The Exact Weight Scale Co., Columbus, O.
Shadowplaid	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Sheer-Glaze	Tissue paper	Thilmany Pulp & Paper Co., Kuakauna, Wis.
Sheer Sheen	Mica coated papers	Hazen Paper Co., Holyoke, Mass.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Sheffalloy	Collapsible tube metal	New England Collapsible Tube, Co., Chicago, Ill.
Sheffield Process	Method of tempering collapsible tube metals	New England Collapsible Tube, Co., Chicago, Ill.
Sheipco 4 Star	Silver chests for packaging silverware	Henry H. Sheip Mfg. Co., Phila., Pa.
Shellback	Double shell caps	Anchor Hocking Glass Corp., Lancaster, O.
Shell-Tint	Transparent tint over portions of transparent cellulose wraps	Shellmar Products Co., Mt. Vernon, O.
Shell-Glo	Clear transparent laminated cellulose	Shellmar Products Co., Mt. Vernon, O.
Shell-Pax	Transparent cellulose containers	Shellmar Products Co., Mt. Vernon, O.
Shell-Pli	Printed laminated cellulose	Shellmar Products Co., Mt. Vernon, O.
Shell-Vue	Transparent gummed acetate posters	Shellmar Products Co., Mt. Vernon, O.
Shield-Pak	Corrugated for box interiors	Ajax Box Co., Chicago, Ill.
Shnflex	Protective coating compounds	Gordon-Lacey Chemical Products Co., Maspeth, L. I., N. Y.
Shoksorb	Indented packing paper	Schmidt & Ault Paper Co., York, Pa.
Shopak	Transparent acetate containers	Shaw Paper Box Co., Meriden, Conn.
Showbox	Transparent boxes	Central States Paper & Bag Co., St. Louis, Mo.
Showmaster	Electric turntables	Motion Displays, Inc., Bklyn, N. Y.
Shu-Pac	Shoe boxes	Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Shy-Nee	Printing inks, lithographic supplies	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Signodes	Steel strapping	Signode Steel Strapping Co., Chicago, Ill.
Sillidex	Dry, cold water soluble adhesive	National Adhesives, New York, N. Y.
Silk Sheen	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Silray	Silver coated paper	The Marvellum Co., Holyoke, Mass.
Silvalum	Silver embossed paper	Springfield Coated Paper Corp., Camden, N. J.
Silvaneer	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Silver Beams	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Silver Foil 1941	Metallic coated, silver, plain and embossed	Louis Dejonge & Co., New York, N. Y.
Silverglos	Silver print paper	The Marvellum Co., Holyoke, Mass.
Silver King	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Silverlink	Roller chain	Link-Belt Co., Chicago. Ill.
Silverlite	Imitation foil	Louis Dejonge & Co., New York, N. Y.
Silver Mosaic	Brightwood kid finish papers	Holyoke Card & Paper Co., Springfield, Mass.
Silver Plaid	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Silverseal	Colored specialty tape	Gummed Tape & Devices Co., Bklyn, N. Y.
Silversheen	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Silver Shredder	Paper shredding machine	Industrial Shredder & Cutter Co., Salem, O.
Silverstitch	Stitching wire	Acme Steel Co., Chicago, Ill.
Silverstitcher	Stitching machine	Acme Steel Co., Chicago, Ill.
Silverstreak	Silent chain	Link-Belt Co., Chicago, Ill.
Silvertone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Silvertone	Metallized cellulose ribbon	Fibre Cord Co., New York, N. Y.
Sil-Vor-Plate	Aluminum bronze ink	Geo. H. Morrill Co., Div. General Printing Ink Corp., New York, N. Y.
Simco	Static eliminators	Maxson Automatic Machinery Co., Westerly, R. I.
Sim-Pac	Folding boxes shipped flat	Paper Package Co., Indianapolis, Ind.
Simplex	Wire staples	Acme Staple Co., Camden, N. J.
Simplex	Automatic tape dispenser	Better Packages, Inc., Shelton, Conn.
Simplex	Pie and cake container	Milprint, Inc., Milwaukee, Wis.
Simplex	Folding paper boxes	Simplex Paper Box Corp., Lancaster, Pa.
Simplex Hi-Speed	Bag making machine	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Single Plate	Filter	Karl Kiefer Machine Co., Cincinnati, O.
Singletin	One-use collapsible tube	Victor Metal Products Corp., Bklyn, N. Y.
Singl-Vu	Window cartons	Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Sisseal's'	Water-resistant asphalt, resin	Power Products, Inc., Chicago, Ill.
Skytogen	Box paper	Kupfer Bros. Co., New York, N. Y.
Skytone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Slak-Tite	Closure for slack filled paper bag	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Slant Side	Sloping side folding box	Michigan Carton Co., Battle Creek, Mich.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
SlideLid	Tablet boxes	Columbia Specialty Co., Inc., Baltimore, Md.
Slide-Off	Water type decalcomania	The Palm Bros. Decalcomania Co., Cincinnati, O.
Smithcrafted	Metal wood leatherette boxes and displays	The S. K. Smith Co., Chicago, Ill.
Snack-Sacks	Sandwich bags	Thomas M. Royal & Co., Phila., Pa.
Snac-Pak	Corrugated basket container for cakes	The Ashtabula Corrugated Box Co., Ashtabula, O.
Snake Tape	Waterproof, reinforced gummed tape	Angier Corp., Framingham, Mass.
Snap-Loks	Attaching device embedded in tag	Dennison Mfg. Co., Framingham, Mass.
Snap-on	Cap for application to reuse tumblers	Sterling Seal Co., Erie, Pa.
Snopaque	Opaque, white glassine	Riegel Paper Corp., New York, N. Y.
Snowcap	Lining paper	Bradner Smith & Co., Chicago, Ill.
Snowdrift	Greaseproof paper	Rhinelander Paper Co., Rhinelander, Wis.
Snowflake	Padding	American Lace Paper Co., Milwaukee, Wis.
Snowflake and Star	Box covering paper	Holyoke Card & Paper Co., Springfield, Mass.
Snow White Litho	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Snowhite Stiktite	Box wrap	Fitchburg Paper Co., Fitchburg, Mass.
Solseal	Waterproof gummed tape	Atlantic Gummed Paper Corp., Bklyn, N. Y.
Solec	Cellulose cement	Mees & Waldstein Co., Newark, N. J.
Solar	Box covers	District of Columbia Paper Mills, Inc., Washington, D.C.
Soldertite	Can spouts	Standard Specialty & Tube Co., New Brighton, Pa.
Solidry	Inks and varnishes	Pope & Gray, Inc., New York, N. Y.
Solseal	Water-resistant gummed tape	Central Paper Co., Menasha, Wis.
Sonnettes	Box paper	Kupfer Bros. Co., New York, N. Y.
Sorbolite	Light proof board	Waldorf Paper Products Co., St. Paul, Minn.
Sorting Scale	Automatic continuous check-weighing and sorting scale	Merrick Scale Mfg. Co., Passaic, N. J.
Spangles	Cellophane flock	Rayon Processing Co. of R. I., Central Falls, R. I.
Spede-Pac	Ice cream pail	Bloomer Bros. Co., Newark, Wayne Co., New York State
Speedliseal	Tablet tape	Gummed Tape & Devices Co., Bklyn, N. Y.
Speed Limit	Halftone black inks	International Printing Ink Div. of Interchemical Corp., New York, N. Y.
Spee-D-Mark	Cellulose bags	U. S. Envelope Co., Springfield, Mass.
Speedweigh	Over and under checking scale	Toledo Scale Co., Toledo, Ohio
Speedway	Motors and display turntables	Speedway Mfg. Co., Cicero, Ill.
Sphinx	Adhesives	Arabol Mfg. Co., New York, N. Y.
Spiralon	Flint and foil box papers	Hazen Paper Co., Holyoke, Mass.
Spongeflex	Flexible non-warp glues	Paisley Products, Inc., Chicago, Ill.
Sport-Art	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Spot Lite	Glassine wrappers	Milprint, Inc., Milwaukee, Wis.
Sprague	Canning machinery	Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill.
Spray	Non-offset spray solution	Paisley Products, Inc., Chicago, Ill.
Springtime Line	Box cover paper	Matthias Paper Corp., Phila., Pa.
Spun-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Square-Pak	Paraffined ice cream container	Marathon Corp., Menasha, Wis.
Square Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Square-Tex	Printed box paper	The Marvellum Co., Holyoke, Mass.
Sta-Ahead	Hat stickers	Gummed Tape & Devices Co., Bklyn, N. Y.
Sta-Fresh	Waxed glassine bags	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Sta-Seal	Machines, wrapping	Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.
Stainless	Metal foils	Keller-Dorian Corp., New York, N. Y.
Standard	Labeling machine and accessories	Liquid-Carbonic Corp., Chicago, Ill.
Standard Package Sealer	Gummed tape dispensing machines	Gummed Tape & Devices Co., Bklyn, N. Y.
Standee	Automatic multiwall paper bags	Union Bag & Paper Corp., New York, N. Y.
Stannum	Liquid paste	National Adhesives, New York, N. Y.
Stannyn	Imitation metallic paper	Kupfer Bros. Co., New York, N. Y.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Stapak	Fibre shipping drums	The Container Co., Div. Continental Can Co., Inc., Van Wert, O.
Staplecraft	Hand, foot, motorized stapling machines	Acme Staple Co., Camden, N. J.
Star	Adhesive	Bingham Bros. Co., New York, N. Y.
Star	Fountain marker	Wm. A. Force & Co., Inc., Bklyn, N. Y.
Star and Step	Box covers	District of Columbia Paper Mills, Inc., Washington, D.C.
Star Brand	Adhesives	Bingham Bros. Co., New York, N. Y.
Stardust	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Star Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Staybound	Cold process padding gum	The Commercial Paste Co., Columbus, O.
Staystuck	Crown closure	Ferdinand Gutmann & Co., Bklyn, N. Y.
Staytite	Gummed stay tape	Bradner Smith & Co., Chicago, Ill.
Steel-Forge	Casters	The Rapids-Standard Co., Inc., Grand Rapids, Mich.
Steel-Set	Industrial all-purpose repair glue	Paisley Products, Inc., Chicago, Ill.
Steelstrap	Steel strapping	Acme Steel Co., Chicago, Ill.
Stek-O	Labeling paste powder	Clark Stek-O Corp., Rochester, N. Y.
Sterilined	Inner lined containers	The Interstate Folding Box Co., Middletown, O.
Sterling Tread	Gummed paper tape	The Gummed Products Co., Troy, O.
Stikfast	Label pasters	Diagraph-Bradley Stencil Machine Corp., St. Louis, Mo.
Stiktotin	Adhesive for labeling metal containers	Marks Chemical Works, New York, N. Y.
Streamer Bows	Pre-tied cellulose bows	Stark Bros. Ribbon Corp., New York, N. Y.
Stretchrap	Wrapping machine	Stokes & Smith Co., Frankford, Phila., Pa.
Stripcoat	Hot dip stripping melt	Dow Chemical Co., Midland, Mich.
Stripe & Pine	Fancy printed Christmas papers	Louis Dejonge & Co., New York, N. Y.
Striplex	Box stripping glue	National Adhesives, New York, N. Y.
Stripseal	Ethylcellulose stripping compound	Wills & Roberts Plastics Mfg. Corp., Pasadena, Calif.
Stripsol	Cold water soluble stripping glue	Paisley Products, Inc., Chicago, Ill.
Sturdite	Leather cloth	Holliston Mills, Inc., Norwood, Mass.
Styl-O-Matic	Unscrambling table and bottle conveyor	Island Equipment Corp., New York, N. Y.
Style-Curve	Corrugated display material	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Styron	Polystyrene molding granules	The Dow Chemical Co., Midland, Mich.
Submerso-Pak	Moistureproof bags	Cincinnati Industries, Inc., Cincinnati (Lockland), O.
SUco	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Suedette	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Sullmanco	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Sunalloy	Tin substitute for tubes	Sun Tube Corp., Hillside, N. J.
Sunburst	Wide mouth food ware	Armstrong Cork Co., Lancaster, Pa.
Sunco	Dry colors	Sun Chemical & Color Co., Div. General Printing Ink Corp., Harrison, N. J.
Sunex	Transparent sheet	American Phenolic Corp., Chicago, Ill.
Sunrise	Sealing tapes	McLaurin-Jones Co., Brookfield, Mass.
Sunshine	Box cover paper	Matthias Paper Corp., Phila., Pa.
Sunshine	Box coverings	Bradner Smith & Co., Chicago, Ill.
Super-Cell	Egg cartons	Interstate Folding Box Co., Middletown, O.
Superend	Ending glue	National Adhesives, New York, N. Y.
Super Fibre	Box board, metal edge boxes	National Metal Edge Box Co., Phila, Pa.
Super-Gloss	White ivory embossed and plain papers	The Marvellum Co., Holyoke, Mass.
Superkleen	Bottle washing machine	The Liquid Carbonic Corp., Chicago, Ill.
Supersaal	Heat sealing glassine	Hartford City Paper Co., Hartford City, Ind.
Super Seal	Bread wrappers	Marathon Corp., Menasha, Wis.
Super-Seal	Leakproof cellophane bags	The Munson Bag Co., Cleveland, O.
Super-Seal	Glass vacuum jar	Super-Seal Container Corp., Washington, D. C.
Superset	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Superstrip	Stripping glue	National Adhesives, New York, N. Y.
Superwrap	Tight wrapping glue	National Adhesives, New York, N. Y.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Supreme Blacks	Lithographic inks	E. J. Kelly Co., Kalamazoo, Mich.
Sure-Grip	Steel Stamp	Jas. H. Matthews & Co., Pittsburgh, Pa.
Sure-Set	Rubber type holder	Jas. H. Matthews & Co., Pittsburgh, Pa.
Surehold	Sealing tape	Nashua Gummed & Coated Co., Nashua, N. H.
Sure Shot	Wire staples	Acme Staple Co., Camden, N. J.
Susan	Rayon ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
SUtility	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
SUtone	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
SUveneer	Printing inks	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Sweetless	Dusting powder for paper workers hands	Paisley Products, Inc., Chicago, Ill.
Sweepstakes	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Sweetone	Geo. H. Sweetnam products	Geo. H. Sweetnam, Inc., Cambridge, Mass.
Sylphcase	Casings for meats	Sylvania Industrial Corp., New York, N. Y.
Sylph-Flake	Sylphrap confetti	Sylvania Industrial Corp., New York, N. Y.
Sylphrap	Transparent cellulose sheeting	Sylvania Industrial Corp., New York, N. Y.
Sylphseal	Bands, viscose (self-sealing)	Sylvania Industrial Corp., New York, N. Y.
Sylph-Thin	Casings for meats	Sylvania Industrial Corp., New York, N. Y.
Synchro Ink	Printing inks, lithographic supplies	International Printing Ink, Div. Interchemical Corp., New York N. Y.
Syntron	Organic protective coatings	Gordon-Lacey Chemical Prods. Co., Maspeth, L. I., N. Y.
Syntron	Weighing machines, vibrators and packers	Syntron Co., Homer City, Pa.

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T.W.	Liquid tightwrap glue	Paisley Products, Inc., Chicago, Ill.
Tag-O-Graph	Tag and label addressing machines	Weber Addressing Machine Co., Chicago, Ill.
Tamper-Proof	Rupturing band tamper-proof	Aluminum Seal Co., New Kensington, Pa.
Tanglefoot	Gummed kraft tape	The Tanglefoot Co., Grand Rapids, Mich.
Tap-A-Flow	Closure dispenser	Federal Tool Corp., Chicago, Ill.
Tapoganth	Stripping gum	Stein, Hall & Co., Inc., New York, N. Y.
Tape Shooter	Sealing tape machine	Better Packages, Inc., Shelton, Conn.
Tappit	Liquid dispensers	Food Dispenser Co., Hartford, Conn.
Tarcette	Box paper	Kupfer Bros. Co., New York, N. Y.
Taylor Made	Boxes	Taylor Box Co., Providence, R. I.
Tayper	Tape moistening machine	Nashua Package Sealing Co., Inc., Nashua, N. H.
Tegumat L-2	Waterproof paper	W. Ralston & Co., Inc., Niagara Falls, N. Y.
Telestop	Dispensing box	National Folding Box Co., New Haven, Conn.
Television	Metal and cellulose acetate cans	Geo. V. Clark Co., Inc., L. I. C., N. Y.
Tell-U-Tags	Marking tags	Dennison Mfg. Co., Framingham, Mass.
Tel-tale	Indicator type silica gel	The Davison Chemical Corp. Baltimore, Md.
Tenace	Gummed tape	Stein, Hall & Co., Inc., New York, N. Y.
Tenite	Cellulose acetate molding compound	Tennessee Eastman Corp., Kingsport, Tenn.
Tenite I	Cellulose acetate molding composition	Tennessee Eastman Corp., Kingsport, Tenn.
Tenite II	Cellulose acetate butyrate molding compound	Tennessee Eastman Corp., Kingsport, Tenn.
Tension Tie	String and button closure	Tension Envelope Corp., Kansas City, Mo.
Texcel Tape	Cellulose pressure sensitive tape	Industrial Tape Corp., New Brunswick, N. J.
Texkraft	Pyroxylin coated composition base sheet	Textileather Corp., Toledo, O.
Textoi	Leatherette box covering	Farrington Mfg. Co., Boston, Mass.
Tex-Pac	Corrugated shipping container	Old Dominion Box Co., Lynchburg, Va.
Texrope	Multiple V-belt drive	Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Textileather	Pyroxylin coated textile	Textileather Corp., Toledo, O.
Textile Prints	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Textiloid	Lacquered rag paper	Textileather Corp., Toledo, O.
Textolite	Molded, laminated and extruded plastic	General Electric Co., Plastic Div., Pittsfield, Mass.
Thelid	Low pressure laminating resins	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Thermium	Heat sealing paper and tape	Seal, Inc., Shelton, Conn.
Thermo	Tin printing inks	Crescent Ink & Color Co. of Pa., Phila., Pa.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Thermo Cote	Ethyl-cellulose protective stripping compound	Ernst Bischoff Co., Inc., New York, N. Y.
Thermocurl	Machine, beading ends of plastic cylinders	Taber Instrument Co., N. Tonawanda, N. Y.
Thermodraw	Machine, drawing containers from sheet plastic	Taber Instrument Co., N. Tonawanda, N. Y.
Thermofold	Rigid transparent fabricating machines	Taber Instrument Co., N. Tonawanda, N. Y.
Thermoloid	Asphaltum impregnated fibre plastic material	Chaspec Mfg. Co., Inc., New York, N. Y.
Thermo-Matic	Heat-seal label applier	New Jersey Machine Corp., Hoboken, N. J.
Thermo-Phane	Highly moisture resistant, heat sealable, laminated paper	Interstate Folding Box Co., Middletown, O.
Thermoseal	Thermoplastic closure wraps, bags, liners	Benj. C. Betner Co., Devon, Pa.
Therm-O-Top	Heat seal closure	Thomas M. Royal & Co., Phila., Pa.
The Master	Fibre shipping drums	The Master Package Corp., Owen, Wis.
Thilco	Paper specialties	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Thin-Wrap	Machines for wrapping with crimped ends	Miller Wrapping & Sealing Machine Co., Chicago, Ill.
Thistle	All types of adhesives	Arvey Corp., Jersey City, N. J.
Three In One	Steel strapping tightening, sealing, and cutting tool	Stanley Works, New Britain, Conn.
3-M	Adhesives	Minnesota Mining & Mfg. Co., St. Paul, Minn.
Three-Point	Press printing machinery	Kidder Press Co., Inc., Dover, N. H.
Thrifty	Box cover papers	Pejepscot Paper Co., Inc., New York, N. Y.
Throway	No deposit, no return throw-away beer bottles	Anchor Hocking Glass Corp., Lancaster, O.
Tieco	General	Triangle Ink & Color Co., Inc., Bklyn, N. Y.
Tie-Tie	Gift wrappings, cards, ribbons, seals	Chicago Printed String Co., Chicago, Ill.
Tiger Stay	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Timely Suggestions	Box paper	Kupfer Bros. Co., New York, N. Y.
Tinick	Tin and zinc coated paper and boards	Keller-Dorian Corp., New York, N. Y.
Tinsley	Display carton	Robert Gair Co., Inc., New York, N. Y.
Tinstic	Liquid paste	National Adhesives, New York, N. Y.
Tin-Tak	Glue	The F. G. Findley Co., Milwaukee, Wis.
Tiny Midget	Static eliminator	The Simco Co., Phila., Pa.
Tiplift	Milk bottle cap	Sealright Co., Inc., Fulton, N. Y.
Tip Off	Closure	Owens-Illinois Glass Co., Toledo, O.
Tite-Fit Tubing	Elastic tubing for covering regular and irregular shaped packages	Bemis Bro. Bag Co., St. Louis, Mo.
Tite-Lok	Square flat cellophane bags	Oneida Paper Products, Inc., New York, N. Y., also Continental Bag Specialties Corp., New York, N. Y.
Titelok	Cylindrical paper container	Sutherland Paper Co., Kalamazoo, Mich.
Tite-Seal	Cellophane bags and liners	Traver Corp., Chicago, Ill.
Tite-Top	Two-piece, locking cover box	National Folding Box Co., New Haven, Conn.
Tone-Craft	Display, corrugated	Sherman Paper Products Corp., Newton Upper Falls, Mass.
Topcote	Moisture-resistant coating	Brooks Bank Note Co., Springfield, Mass.
Topmost	Wire-handle paper pail (tin-seal)	Sutherland Paper Co., Kalamazoo, Mich.
Topper	Bottle carriers	Container Corp. of America, Chicago, Ill.
Traco	Plain and printed cellophane products	Traver Corp., Chicago, Ill.
Traco-Paks	Wrappers for food products	Traver Corp., Chicago, Ill.
Tran-Cal-Seal	Cellulose tape	Gummed Tape & Devices Co., Bklyn, N. Y.
Transeen	Transparent sulphite self-sealing wrappers	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Transel	Printed embossed transparent cellulose	The Marvellum Co., Holyoke, Mass.
Transitone	Leatherette paper	Bradner Smith & Co., Chicago, Ill.
Transol	Solvent for removing transfers	Kaumagraph Co., Wilmington, Del.
Transowrap	Transparent cellulose sheeting	Transolene Co., Barrington, Ill.
Transpak	Chipboard container	Transcontinental Container Corp., Corona, N. Y.
Transplastics	Transparent plastics process	Waterbury Companies, Inc., Waterbury, Conn.
Trans-Print	Printing on transparent sheeting	The Forbes Litho. Mfg. Co., Boston, Mass.
Translate Bags	Combination cellophane and glassine bags	The Interstate Folding Box Co., Middletown, O.
Transwrap	Automatic packaging machine	Stokes & Smith Co., Frankford, Phila., Pa.
Tra-Pac	Refrigerator ice cream package	Bloomer Bros. Co., Newark, New York State
Trapcote	Grease resistant coating	Brooks Bank Note Co., Springfield, Mass.
Traversheen	Decorative wrappers and bands	Traver Corp., Chicago, Ill.
Tray-Pax	Transparent cellulose sheet with rigid base or back	Shellmar Products Co., Mt. Vernon, O.
Treasure Chest	Pyrometer checking set	Thwing-Albert Instrument Co., Phila., Pa.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Tredonia	Moistureproof and greaseproof cartons	Fibreboard Products, Inc., San Francisco, Calif.
Tredonia	Moistureproof and greaseproof boxboard and boxes	Grant Paper Box Co., Pittsburgh, Pa.
Tredonia Board	Moistureproof and greaseproof boxboard	The Butterfield-Barry Co., Inc., New York, N. Y.
Trees, Angel, Deer	Fancy-printed Christmas papers	Louis Dejonge & Co., New York, N. Y.
Tricolette	Box paper	Kupfer Bros. Co., New York, N. Y.
Triple Lock	Triple strength bottom cellophane bag	The Dobeckmun Co., Cleveland, O.
Triple Seal	Closure	Owens-Illinois Glass Co., Toledo, O.
Triple-Tac	Double corrugated for packing	Sherman Paper Products Co., Newton Upper Falls, Mass.
Triplelite	Special friction top paint can	Continental Can Co., New York, N. Y.
Triplex	Labeling machines	The Liquid Carbonic Corp., Chicago, Ill.
Tri-Seal	Metal cigar wraps	Reynolds Metals Co., Richmond, Va.
Tri-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Tritact	Moisture-vaporproof cellulose film	The Dobeckmun Co., Cleveland, O.
Triumph	Steel type holders	Jas. H. Matthews & Co., Pittsburgh, Pa.
Trojan	Gummed paper tape	The Gummed Products Co., Troy, O.
Trophy	Metallic paper	Bradner Smith & Co., Chicago, Ill.
Tru-Art	Pictorials, food—illustrations, labels and cartons	Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Tru-Hue	Patented window and counter displays	James Andrew DeNina, New York, N. Y.
Tru-Pak	Satchel-bottom bags	Cupples-Hesse Corp., St. Louis, Mo.
Trutite	Key opening vacuum can	Continental Can Co., New York, N. Y.
Tru-Tone	Food pictorials for canned goods labels	The U. S. Printing & Lithograph Co., Cincinnati, O.
Tru-Vu	Pictorials, food—illustrations, labels and cartons	Rossotti Lithographing Co., Inc., N. Bergen, N. J.
Try-Sax	Cotton seed bags with trier stripes	Bemis Bro. Bag Co., St. Louis, Mo.
Tubol	Tube winding liquid adhesive	Stein, Hall & Co., Inc., New York, N. Y.
Tuf-Face	Steel stamp	Jas. H. Matthews & Co., Pittsburgh, Pa.
Tuffy	Nursing bottle (heat resistant glass)	Brockway Glass Co., Brockway, Pa.
Tufwet	Wet strength paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Tu-Ply	Plywood shipping drum	Seymour & Peck Co., Chicago, Ill.
Turret	Automatic labeler	Economic Machinery Co., Worcester, Mass.
Tutone	Box covering paper	Chas. W. Williams & Co., Inc. New York, N. Y.
Twinkle-Sheen	Embossed mica paper	Hazen Paper Co., Holyoke, Mass.
Twinkles	Cone-shaped paper packing for ice cream	Dixie Cup Co., Easton, Pa.
Twist Ems	Wire reinforced tape	Germain's, Los Angeles, Calif.
250 Gum	Adhesives, starch derived	Stein, Hall & Co., Inc., New York, N. Y.
Two-In-One	Combined letter and sample mailing bag	Bemis Bro. Bag Co., St. Louis, Mo.
TwoTone	Transparent ribbons and ties	Fibre Cord Co., New York, N. Y.
Two View	Label, food products	Muirson Label Co., Inc., Bklyn, N. Y.
Two Way	Labels for cans and glass	Muirson Label Co., Inc., Bklyn, N. Y.

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U.F. Disk	Filter	Scientific Filter Co., New York, N. Y.
U.S.	Bottling machinery	U. S. Bottlers Machinery Co., Chicago, Ill.
Uformite	Urea-formaldehyde molding compounds and resins	Resinous Products & Chemical Co., Phila., Pa.
Ullmanine	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Ultimate	Package filer	Island Equipment Corp., New York, N. Y.
Ultropaque	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Unifoil	Light gauge metal mounted paper backing	Reynolds Metals Co., Richmond, Va.
Unifold	One-piece folding garment box	Gardner-Richardson Co., Middletown, O.
Union	Point-of-sale displays	Union Steel Products Co., Albion, Mich.
Uniplex	Lug cap	National Seal Corp., Bklyn, N. Y.
Uniseal	Can sealing compound	The Max Ams Machines Co., Bridgeport, Conn.
Uniseal-Hermo Oil-proof	Sealing fluid for can ends	The Max Ams Machine Co., Bridgeport, Conn.
Unishell	One piece cap substitute for double shell cap	National Seal Corp., Bklyn, N. Y.
Unishell	Special one-piece screw cap	Continental Can Co., New York, N. Y.
Unitainer	One dose containers	Sun Tube Corp., Hillside, N. J.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
United	Box covering and greeting card paper	United Mfg. Co., Springfield, Mass.
Unit Load	Steel band freight bracing method	Acme Steel Co., Chicago, Ill.
Universal	Stenciling fountain brush	Wm. A. Force & Co., Inc., Bklyn, N. Y.
Universal	Filling machines	Stokes & Smith, Frankford Phila., Pa.
Universal	Tablet counting and filling machine	Ivers-Lee Co., Newark, N. J.
Universal	Conveyor chain	Link-Belt Co., Chicago, Ill.
Universal	Bottle washers	The Liquid Carbonic Corp., Chicago, Ill.
Universal-Kottoner	Cotton wadding machine	Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Upaco	Industrial adhesives	Union Paste Co., Hyde Park, Mass.
U-Press-It	Special opening pouring spout and cap	Continental Can Co., New York, N. Y.
Urac	Urea-formaldehyde adhesives	American Cyanamid Co., Plastics Div., New York, N. Y.
tilastic	Rubber to metal adhesive	Paisley Products, Inc., Chicago, Ill.
Utilitape	Cloth pressure sensitive water-resistant tape	Industrial Tape Corp., New Brunswick, N. J.
Utility	Filling machines	Triangle Package Machinery Co., Chicago, Ill.

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V-Film	Synthetic transparent sheeting	Goodyear Tire & Rubber Co., Akron, O.
V-Line	Greaseproof, non-corrosive papers	Sherman Paper Products Corp. Newton Upper Falls, Mass.
V P O Closures	Vacuum pry-off metal caps	Crown Cork & Seal Co., Baltimore, Md.
V-Seal	Resin adhesive	National Adhesives, New York, N. Y.
V Seal 27	Water-resistant adhesive for cases	Stein, Hall & Co., Inc., New York, N. Y.
Vac-A-Loc	Jar closure	Brockway Glass Co., Inc., Brockway, Pa.
Vacutop	Brush and applicator closures	Double Duty Products, Inc., Cleveland, O.
Val Hue	Fused cut edge acetate rayon ribbon	Wm. E. Wright & Sons Co., West Warren, Mass.
Valvo	Collapsible tubes	National Collapsible Tube Co., Providence, R. I.
Vanity Line	Box cover paper	Matthias Paper Corp., Phila., Pa.
Vapetex	Thermoplastic coated board	The Interstate Folding Box Co., Middletown, O.
Vapolith	Heat-set inks (offset)	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Vapometer	Vapor transmission tester	Thwing-Albert Instrument Co., Phila., Pa.
Vapor Shield	Moisture resistant paper	Rexford Paper Co., Milwaukee, Wis.
Vaporin	Heat-set inks	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Vaporin M.S.	Moisture-set inks	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Vaposeal	Glassine paper lacquer coated	Westfield River Paper Co., Inc., Russell, Mass.
Vapotite	Wax laminated paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Vari-Pitch	Variable speed V-belt transmission	Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Vari-Tint	Name plates, seals	L. F. Grammes & Sons, Inc., Allentown, Pa.
Vari-Visco	Filling machine for viscous materials	Karl Kiefer Machine Co., Cincinnati, O.
Vegimal	Liquid tightwrap setup box glue	Paisley Products, Inc., Chicago, Ill.
Velboard	Velour box or chip board	Cellusuede Products, Inc., Rockford, Ill.
Velmar	Waterproof antique coated papers	The Marvellum Co., Holyoke, Mass.
Velmat	Greeting card paper	Springfield Coated Paper Corp., Camden, N. J.
Velmo	Box paper	The Marvellum Co., Holyoke, Mass.
Velvet Chintz	Printed dull coated paper	Hampden Glazed Paper & Card Co., Holyoke, Mass.
Versailles Satintone	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Vibra-Flow	Vibrating feeders, conveyors	Syntron Co., Homer City, Pa.
Vibra-Veyor	Heater for plastic powder	Infra-Red Engineers & Designers, Cleveland, O.
Vibrox	Packers & settlers	B. F. Gump Co., Chicago, Ill.
Vichrome	Synthetic coating for protection against corrosive agents	Ault & Wiborg, Div. Interchemical Corp., New York, N. Y.
Victor	Closures, collapsible tubes and metal vials	Victor Products Corp., Bklyn, N. Y.
Victoria	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Victorian Floral	Fancy paper	Louis Dejonge & Co., New York, N. Y.
Victor Tape	Printed advertising tape	Chicago Printed String Co., Chicago, Ill.
Victory	Rayon cut edge ribbon	Freydberg Bros.-Strauss, Inc., New York, N. Y.
Victorywrap	Heat sealing moisture-vapor resistant paper	Traver Corp., Chicago, Ill.

Addresses of companies listed appear on pages 945–955

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
View Pac	Transparent bags, envelopes, rigid boxes	U. S. Envelope Co., Springfield, Mass.
Vigorette	Box paper	Kupfer Bros. Co., New York, N. Y.
Viking	Cellulose window gluing combining machine	E. G. Staude Mfg. Co., St. Paul, Minn.
Vimlite	Cellulose acetate impregnated wire	Celanese Plastics Corp., New York, N. Y.
Vinicote	Internal lining series	New England Collapsible Tube Co., Chicago, Ill.
Vinyl Butyral	Polyvinyl butyral compound	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Vinylac	Vinyl lacquer solutions	Gordon-Lacey Chemical Products Co., Maspeth, L. I., N. Y.
Vinylite	Plastics and resins	Bakelite Corp., New York, N. Y.
Virkotype	Raised printing compounds	Wood, Nathan & Virkus Co., Inc., Racine, Wis.
Visco	Filling machine for viscous materials	Karl Kiefer Machine Co., Cincinnati, O.
Visinet	Open-mesh bags	Bemis Bro. Bag Co., St. Louis, Mo.
Visitainer	Transparent container	Old Dominion Box Co., Lynchburg, Va.
Visking	Cellulose sausage casings, tubing	The Visking Corp., Chicago, Ill.
Visowrap	Cellophane and paper window wrapper	The Dobeckmun Co., Cleveland, O.
Visualize	Window and transparent bags	Paramount Paper Products Co., Inc., Phila., Pa.
Vitafilm	Transparent rubber-hydrochloride film	The Goodyear Tire & Rubber Co., Akron, O.
Vivo-Lith Vignettes	Direct color photographic reproduction for labels, seed packets, etc.	Stecher-Traung Lithograph Corp., Rochester, N. Y.
Viz	Molded plastics	Molded Insulation Co., Phila., Pa.
Vol-U-Meter	Semi-automatic drum filling valve	The Vol-U-Meter Co., Buffalo, N. Y.
Vortex Cups	Paper drinking cups and containers	Dixie-Vortex Co., Easton, Pa.
Vue Lite	Translucent plastic sheets	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Vue-Pac	Cellophane window display cartons	Gordon-Lavin Paper Box Co., Inc., Baltimore, Md.
Vuepak	Continuous length acetate film	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Vuepak	Rigid transparent materials	Monsanto Chemical Co., Plastics Div., Springfield, Mass.
Vulcabeston	Synthetic rubber and asbestos	Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Vu-Net	Open mesh bags	The Grimes Co., Denver, Colo.

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Wabacoal	Coated board	Container Corp. of America, Chicago, Ill.
Walsello	Cellophane ribbons	The Walser Mfg. Co., Inc., Clifton, N. J.
Ware Foils	Coated box coverings	McLaurin-Jones Co., Brookfield, Mass.
Waregold-Ware	Gold and platinum box coverings	McLaurin-Jones Co., Brookfield, Mass.
Warelac	Coated box coverings	McLaurin-Jones Co., Brookfield, Mass.
Wareplatinum	Platinum box covering	McLaurin-Jones Co., Brookfield, Mass.
Ware Super Colors	Coated box coverings	McLaurin-Jones Co., Brookfield, Mass.
Warnercraft	Set-up and folding boxes	The Warner Bros. Co., Bridgeport, Conn.
Warp-Proof	Glue	The F. G. Findley Co., Milwaukee, Wis.
Washington Brilliant	Box covers	District of Columbia Paper Mills, Inc., Washington, D. C.
Water-Tite	Waterproof paper	Rexford Paper Co., Milwaukee, Wis.
Waxcote	Wax coated paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Waxmaster	Heating and dipping tank for waxes	Aeroil Burner Co., W. New York, N. J.
Wax-Pax	Sandwich bags in packages and bulk	The American Paper Goods Co., Kensington, Conn.
Waxsheen	Highly transparent and glossy cake and candy wrapper	Dixie Wax Paper Co., Inc., Dallas, Texas
Waxsorb	Wax impregnated paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Waxtex	Household roll waxed paper	Marathon Corp., Menasha, Wis.
Weavette	Box paper	Kupfer Bros. Co., New York, N. Y.
Weigh-Flow	Vibrating weighing feeders	Syntron Co., Homer City, Pa.
Weigh Right	Automatic scale fillers	Weigh Right Automatic Scale Co., Joliet, Ill.
Weightograph	Automatic weight recording device	Howe Scale Co., Rutland, Vt.
Weightometer	Automatic conveyor scale	Merrick Scale Mfg. Co., Passaic, N. J.
Wekilte	Coated and foil box papers	Hazen Paper Co., Holyoke, Mass.
Werthy	Ribbons	W-E-R Ribbon Corp., New York, N. Y.
Wesco	Capper	Scientific Filter Co., New York, N. Y.
Whalehide	Crate liners	Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Whirlwind	Electric label paster and screw capper	Scientific Filter Co., New York, N. Y.

TRADE NAME	NATURE OR TYPE OF PRODUCT	COMPANY & ADDRESS
Whitehall	Dispensers	Food Dispenser Co., Hartford, Conn.
Whiz-Tape	Narrow opening tape inserted beneath transparent wrappers	Shellmar Products Co., Mt. Vernon, O.
Whiz Wite	Paper for box wraps and printing	Matthias Paper Corp., Phila., Pa.
Williams Stripe	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Wind-O-Band	Cellulose bands	Armstrong Cork Co., Lancaster, Pa.
Wind-O-Band	Cellulose seal	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Windocel	Cellophane window cartons	Brooks & Porter, Inc., New York, N. Y.
Win-Do-Dec	Corrugated for window trimming	Ajax Box Co., Chicago, Ill.
Windorap	Combination transparent and opaque wrappers	Newark Paraffine & Parchment Paper Co., Newark, N. J.
Windoseals	Milk bottle hoods	Reynolds Metals Co., Richmond, Va.
Winnebago	Kraft, M. F.	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Winnerwite	Box cover paper	Matthias Paper Corp., Phila., Pa.
Wireless	Folded oyster and food pail	Bloomer Bros. Co., Newark, New York State
Wirestrap	Round wire strap	Acme Steel Co., Chicago, Ill.
Wizard	Marking compound	Markem Machine Co., Keene, N. H.
Wizard Iceproof	Glue for labeling bottles	Midland Glue Products Co., Detroit, Mich.
Wonder	Printing inks, lithographic supplies	International Printing Ink, Div. Interchemical Corp., New York, N. Y.
Wonder	Paper box gums	Stein, Hall & Co., Inc., New York, N. Y.
Wonpreshun	Printing ink	Sigmund Ullman Co., Div. General Printing Ink Corp., Bronx, N. Y.
Woodcraft	Imitation wood paper	The Marvellum Co., Holyoke, Mass.
Woodcraft	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Woodette	Box paper	Kupfer Bros. Co., New York, N. Y.
Worlbeater	Hand mixer	Na-Mac Products Corp., Los Angeles, Calif.
World	Automatic and semi-automatic labelers	Economic Machinery Co., Worcester, Mass.
World's Fair	Box covering paper	Chas. W. Williams & Co., Inc., New York, N. Y.
Wotta Blacks	Letterpress inks	E. J. Kelly Co., Kalamazoo, Mich.
Wovenkraft	Reinforced waterproof paper	W. Ralston & Co., Inc., Niagara Falls, N. Y.
Wrap-Ade	Crimping and sealing machines	Wrap-Ade Machine Co., Newark, N. J.
Wrap-Dri	Asphalt laminated paper	Thilmany Pulp & Paper Co., Kaukauna, Wis.
Wrap-O-Matic	Wrapping machines	Lynch Mfg. Corp., Defiance, O.
Wright	Paper drills and punches	Harris - Seybold - Potter Co., Seybold Div., Dayton, O.

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"X" Base	Inks for raised printing	Wood, Nathan & Virkus Co., Inc., Racine, Wis.
X-Crepe	Moistureproof paper	Cincinnati Industries, Inc., Cincinnati (Lockland), O.
X-Flex	Synthetic resin cement	Paisley Products, Inc., Chicago, Ill.

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Yankee Nests	Nest of lock corner wooden boxes	New England Box Co., Greenfield, Mass.
Yuletide	Box paper	Kupfer Bros. Co., New York, N. Y.

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Zapon	Industrial finishes	Atlas Powder Co., Zapon Div., Stamford, Conn., & N. Chicago, Ill.
Zaponite	Wood finishes	Atlas Powder Co., Zapon Div., Stamford, Conn., & N. Chicago, Ill.
Zephyr	Carton gluer	E. G. Staude Mfg. Co., St. Paul, Minn.
Zephyr	Tubing for loaves	The Visking Corp., Chicago, Ill.
Zerocel	Cellophane for frozen foods	Yorkville Paper Co., Inc., New York, N. Y.
Zeronet	Stockinette tubing	Yorkville Paper Co., Inc., New York, N. Y.
Zerorap	Freezer paper	Yorkville Paper Co., Inc., New York, N. Y.
Zero-Seal	Waxed paper	Marathon Corp., Menasha, Wis.
Zip-Strip Seals	Tamper-proof aluminum closures	Guardian Safety Seal Co., Chicago, Ill.
Zip Tape	Cellophane package opening tape	The Dobeckmun Co., Cleveland, O.
Zip-Wrap	Cellophane sheet with pull tape attached	The Dobeckmun Co., Cleveland, O.

Addresses of companies listed appear on pages 945–955

Alphabetical List of Manufacturers and Addresses

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A

A-B-C Packaging Machine Co., 330 S. Sixth St., Quincy, Ill.
Ability Mold & Die Works, 1237 N. California, Chicago, Ill.
Able Machine & Tool Works, 120 W. 22nd St., New York, N. Y.
Accessories Mfg. Co., 127 E. 31st St., Kansas City, Mo.
Accurate Molding Corp., 116–132 Nassau St., Bklyn, N. Y.
Ace Carton Corp., 5800 W. 51st St., Chicago 38, Ill.
Ackerman Plastic Molding, 986 E. 200th St., Cleveland 19, Ohio
Acme Backing Corp., Bogart & Meadow Sts., Bklyn, N. Y.
Acme Burlap Bag Co., 42 Emerson Place, Bklyn, N. Y.
Acme Folding Box Co., 200 Lynch St., St. Louis, Mo.
Acme Folding Box Co., Inc., 141 E. 25th St., New York, N. Y.
Acme Paper Box Co., 5950 S. State St., Chicago, Ill.
Acme Printing Ink Co., 1315 W. Congress St., Chicago 7, Ill.
Acme Staple Co., 1643 Haddon Ave., Camden, N. J.
Acme Steel Co., 2840 Archer Ave., Chicago 8, Ill.
Acraglas Co., The, 1805 14th St., Santa Monica, Calif.
Adams Paper Co., Wells River, Vt.
Addison Lithographing Co., 245 Hollenbeck St., Rochester, N. Y.
Adhesives Mfrs. Assn. of America, 441 Lexington Ave., New York, N. Y.
Adler, H. M. & Co., 305 S. Sharp St., Baltimore, Md.
Adler Engineering Co., 295 Main St., Hackettstown, N. J.
Advance Molding Corp., 54 W. 21st St., New York, N. Y.
Advanced Closures Corp., 46th & First Aves., Bklyn, N. Y.
Advertising Federation of America, 330 W. 42nd St., New York, N. Y.
Advertising Metal Display Co., 822 W. Washington Blvd., Chicago 7, Ill.
Advertising Research Foundation, 11 W. 42nd St., New York, N. Y.
Aeroil Burner Co., Inc., 5701 Park Ave., West New York, N. J.
Aids, Inc., 1220 Broadway, New York, N. Y.
Ajax Bottle Cap Corp., 1226 Flushing Ave., Bklyn, N. Y.
Ajax Box Co., 2210 S. Union Ave., Chicago, Ill.
Albert Paper Box Co., Inc., 360 Furman St., Bklyn, N. Y.
Albia Box & Paper Co., Troy, N. Y.
Alcott, John E., 14 College St., Providence 3, R. I.
Alden Products Co., 117 N. Main St., Brockton, Mass.
Alderman Paper Box Corp., 31 Exchange St., Rochester, N. Y.
Aldine Paper Co., 535 Fourth Ave., New York 17, N. Y.
Aldrich Pump Co., The, 12 Pine St., Allentown, Pa.
Alexander, Jerome, 50 E. 41st St., New York 17, N. Y.
All American Aircraft Products, Inc., 1350 E. Anaheim, Long Beach, Calif.
Allen, Arthur S., 527 Fifth Ave., New York, N. Y.
Allied Barrel Corp., North Seneca St., Oil City, Pa.
Allied Plastics Co., 5225 Wilshire Blvd., Los Angeles, Calif.
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.
Allvue Container, Inc., 169 Franklin Ave., Bklyn, N. Y.
Alsop Engineering Corp., Mildale, Conn.
Alton Box Board Co., Alton, Ill.
Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh 19, Pa.
Aluminum Container Corp., Fulton, N. Y.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Aluminum Seal Co., New Kensington, Pa.
Alvey-Ferguson Co., The, 40 Disney St., Oakley, Cincinnati, Ohio.
Amdeco, 122 Fifth Ave., New York, N. Y.
American Aluminum Ware Co., 368–378 Jelliff Ave., Newark, N. J.
American Assn. of Advertising Agencies, 420 Lexington Ave., New York, N. Y.
American Box Board Co., 470 Market St., S. W., Grand Rapids, Mich.
American Can Co., 230 Park Ave., New York, N. Y.
American Coating Mills, Inc., Division St., Elkhart, Ind.
American Colortype Co., 1151 West Roscoe St., Chicago, Ill.
American Cyanamid Co., Plastics Division, 30 Rockefeller Plaza, New York 20, N. Y.
American Decalcomania Co., 4326–38 Fifth Ave., Chicago, Ill.
American Denture Corp., 536 S. E. 6th Ave., Portland, Ore.
American Drug Mfrs. Assn., 1426 G St., Washington, D. C.
American Excelsior Corp., 1000 N. Halsted St., Chicago 22, Ill.
American Folding Box Co., 1901 Washington Ave., St. Louis, Mo.
American Hard Rubber Co., 11 Mercer St., New York, N. Y.
American Institute of Food Distribution, 420 Lexington Ave., New York, N. Y.
American Insulator Corp., New Freedom, Pa.
American Label Cutting Co., 230 W. 17th St., New York, N. Y.
American Lace Paper Co., 4425 N. Port Washington Ave., Milwaukee 12, Wis.
American Machine & Foundry Co., 511 Fifth Ave., New York 17, N. Y.
American Management Assn., 330 W. 42nd St., New York, N. Y.
American Marketing Assn., School of Business, Indiana University, Bloomington, Ind.
American Meat Institute, 59 E. Van Buren St., Chicago, Ill.
American Molded Products Co., 1753 N. Honore St., Chicago, Ill.
American Molding Co., 355 Fremont St., San Francisco 5, Calif.
American National Bag & Burlap Co., Inc., 343 Kent Ave., Bklyn 11, N. Y.
American Package Co., 402 Lafayette St., New York, N. Y.
American Paper & Pulp Assn., 122 E. 42nd St., New York, N. Y.
American Paper Bottle Co., 1813 Collingwood Blvd., Toledo, Ohio
American Paper Goods Co., The, 449 Main St., Kensington, Conn.
American Perforator Co., The, 625 W. Jackson Blvd., Chicago, Ill.
American Phenolic Corp., 1830 So. 54th Ave., Cicero P. O., Chicago, Ill.
American Plastics Corp., 225 W. 34th St., New York, N. Y.
American Printing Ink Co., Div. General Printing Ink Corp., 2314 W. Kinzie St., Chicago, Ill.
American Products Mfg. Co., 8131 Oleander St., New Orleans, La.
American Resinous Chemicals Corp., 103 Foster St., Peabody, Mass.
American Sealcone Corp., 1911 Park Ave., New York, N. Y.
American Society for Testing Materials, 260 S. Broad St., Phila., Pa.
American Seal-Kap Corp., 11-05 44th Drive, Long Island City, N. Y.
American Spice Trade Assn., 82 Wall St., New York, N. Y.
American Standards Assn., 70 E. 45th St., New York, N. Y.
American Star Cork Co., Inc., 175–177 N. 9th St., Bklyn 11, N. Y.
American Tissue Mills, 12 Crescent St., Holyoke, Mass.
American Tri-State Paper Box Co., 808 17th Ave., N. Nashville, Tenn.
American Veneer Package Assn., 2101 K St., N. W., Washington, D. C.
American Waxed Paper Assn., 1532 Lincoln-Liberty Bldg., Phila., Pa.
Ames Bag Co., 1991 E. 66th St., Cleveland, Ohio
Ames Harris Neville Co., 2800 17th St., San Francisco, Calif.
Amos-Thompson Corp., Edinburgh, Ind.
Ams, Max, Machine Co., The, Scofield Ave., Bridgeport, Conn.
Amsco Packaging Machinery, Inc., 31–31 48th Ave., Long Island City, N. Y.
Analytical Laboratory, The, 921 Bergen Ave., Jersey City, N. J.
Anchor Hocking Glass Corp., 20 Glass Ave., Lancaster, Ohio.
Andersen, A. J., 429 W. Superior St., Chicago 10, Ill.
Anderson Box & Basket Co., 230 Fifth Ave., New York, N. Y.
Anderson, George W., Inc., 36-02 38th St., Long Island City 1, N. Y.
Andrews, O. B., Co., Rossville Blvd., Chattanooga, Tenn.
Andrews, P. L., Corp., 78th & Cooper Ave., Ridgewood Station, Bklyn 27, N. Y.
Angelus Paper Box Co., 751 N. Broadway, Los Angeles, Calif.
Angier Corp., Framingham, Mass.
Anigraphic Process, Inc., 682 E. 133rd St., Bronx, N. Y.
Animated Display Creators, 510 First Ave. N., Minneapolis, Minn.
Apex Paper Box Corp., 2318 Southwestern Ave., Chicago, Ill.
Arabol Mfg. Co., The, 110 E. 42nd St., New York 17, N. Y.
Arenco Machine Co., Inc., 25 W. 43rd St., New York 18, N. Y.
Arens, Egmont, 480 Lexington Ave., New York, N. Y.
Aridor Co., The, 3428 W. 48th Place, Chicago 32, Ill.
Aridye Corp. (subsidiary of Interchemical Corp.), Fair Lawn, N. J.
Arkell & Smiths, 1941 Mill St., Canajoharie, N. Y.
Arkell Safety Bag Co., 10 East 40th St., New York, N. Y.
Armstrong Cork Co., 910 Arch St., Lancaster, Pa.
Armstrong Paint & Varnish Works, 1330 S. Kilbourn Ave., Chicago, Ill.
Arpin Products, Inc., 422 Alden St., Orange, N. J.
Arrow Mfg. Co., Inc., 15th & Hudson Sts., Hoboken, N. J.
Arrow Plastics Corp., 178 River Drive, Passaic, N. J.
Art-Tex, 81 Washington St., New York, N. Y.
Art Tube Co., Inc., 500 Lyons Ave., Irvington 11, N. J.
Artcote Papers, Inc., 390 Coit St., Irvington 11, N. J.
Artisan Plastic Molding Co., 40 Belvidere St., Trenton, N. J.
Artistic Flower Co., 24 E. 21st St., New York 10, N. Y.
Arvey Corp., 300 Communipaw Ave., Jersey City 4, N. J.
Arwood Can Co., Knoxville, Tenn.
Ashtabula Corrugated Box Co., The, 3714 Ann Ave., Ashtabula, Ohio.
Ashuelot Paper Co., Hinsdale, N. H.
Associated Cooperage Industries of America, 408 Olive St., St. Louis, Mo.
Associated Grocery Mfrs. of America, 205 E. 42nd St., New York, N. Y.
Association of Canadian Advertisers, Federal Bldg., Toronto, Ont., Canada
Association of Food Distributors, 100 Hudson St., New York, N. Y.
Association of National Advertisers, 285 Madison Ave., New York, N. Y.
Athol Paper Box Co., 349 Main St., Athol, Mass.
Atlanta Box Factory, Inc., 237–9 Whitehall St., Atlanta, Ga.
Atlanta Paper Co., 225 Moore St., S. E., Atlanta, Ga.
Atlantic Carton Corp., N. Main & 2nd Sts., Norwich, Conn.
Atlantic Excelsior Co., Inc., 11th Ave. & 29th St., New York, N. Y.
Atlantic Gummed Paper Corp., 1 Main St., Bklyn, N. Y.
Atlantic Paper Box Co., 46 Waltham St., Boston, Mass.
Atlantic Paper Box Corp., The, 139 Franklin St., Jersey City, N. J.
Atlantic Plastic & Metal Parts Co., 2730 Grand Ave., Cleveland, Ohio
Atlantic Plastics, Inc., 33-18 57th St., Woodside, N. Y.
Atlas Appliance Corp., 20 Grand Ave., Bklyn, N. Y.
Atlas-Boxmakers, Inc., 2555 W. Diversey Ave., Chicago 47, Ill.
Atlas Gum & Sizing Co., Inc., 406 Pearl St., New York 7, N. Y.
Atlas Plastic Mfg. Co., Inc., 47 Broadway, Lynbrook, L. I., N. Y.
Atlas Powder Co., Zapon Div., N. Chicago, Ill.; Stamford, Conn.
Attleboro Printing & Embossing Co., Inc., 54 Union St., Attleboro, Mass.
Auburn Button Works, Inc., Auburn, N. Y.
Augusta Bag & Burlap Co., 514 Reynolds St., Augusta, Ga.
Auld-Hampton, Inc., 104 Verona Ave., Newark, N. J.
Ault & Wiborg, Div. of Interchemical Corp., 1754 Dana Ave., Cincinnati 7, Ohio
Autokraft Box Corp., Plant No. 2, Maple Ave., Hanover, Pa.
Automatic Paper Box Corp., 1011–25 S. California Ave., Chicago 12, Ill.
Automatic Plastic Products, 1368 Park Ave., Emeryville, Calif.
Automatic Scale Co., Inc., 591 Hudson St., New York, N. Y.
Avery Adhesives, 453 E. 3rd St., Los Angeles 13, Calif.
Ayers, John W., & Son, Bloomfield, N. J.

B

Babbitt Chemical Specialties Co., 630 Fifth Ave., New York 20, N. Y.
Babcock, A. H., Co., The, 43 S. Main St., Attleboro, Mass.
Bach, Alfons, Associates, 11 E. 44th St., New York, N. Y.
Bachmann Bros., Inc., 1420 East Erie Ave., Phila., Pa.
Bader Bros. Bag Co., 1339 Clinton St., Detroit, Mich.
Badger Carton Co., 225 W. Capitol Drive, Milwaukee 10, Wis.
Baermann, Walter, 208 Race St., Holyoke, Mass.
Bagpak, Inc., 220 E. 42nd St., New York 17, N. Y.
Bakelite Corp., 30 E. 42nd St., New York 17, N. Y.
Baker, Willoughby, 2921 Chapman St., Oakland, Calif.
Baker Oil Tools, Inc., P. O. Box. 127, Vernon Station, Los Angeles, Calif.
Baldwin, Eli & Son, Inc., 356 W. 18th St., New York, N. Y.
Ball Bros. Co., Muncie, Ind.
Bangor Box Co., P. O. Box 4, Bangor, Me.
Bannon Bag Co., Inc., The, 820 Magazine St., New Orleans, La.
Barber Colman Co., Molded Products Div., Rockford, Ill.
Barden & Robeson Corp., Penn Yan, N. Y.
Bareco Oil Co., 424 S. Cheyenne, Tulsa, Okla.
Barger Box Co., Inc., 802 W. Beardsley Ave., Elkhart, Ind.
Barnes Plastic Co., 439 E. 58th St., Los Angeles, Calif.
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Bayer, Herbert, 850 7th Ave., New York, N. Y.
Beacon Coutainer Co., 12 E. 41st St., New York, N. Y.
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Beck, Charles, Machine Co., 414 N. 13th St., Phila., Pa.
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Beggs & Graham, 204 Chancellor St., Phila. 6, Pa.
Belleville Can Co., Belleville, N. J.
Bellisio, Bartolomeo, 55 W. 42nd St., New York, N. Y.
Bemis Bro. Bag Co., 111-H N. 4th St., St. Louis 2, Mo.
Bender, H. P., 312 E. 23rd St., New York, N. Y.
Ben Mont Papers, Inc., Mill St., Bennington, Vt.
Bennett, E. W., & Co., 16th & Utah Sts., San Francisco, Calif.
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Bergwood Molding Co., 425–27 W. 6th Street, Kansas City, Mo.
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Berkowitz, Leon L., 1343 Arch St., Phila. 7, Pa.
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Bernardin Bottle Cap Co., Inc., 329 N. W. 4th St., Evansville 10, Ind.
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Berni, Alan, 7 E. 44th St., New York 17, N. Y.
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Berwin Paper Corp., Dansville, N. Y.
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Better Packages, Inc., 255 Canal St., Shelton, Conn.
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Bienfang Paper Co., 220 W. 19th St., New York 11, N. Y.
Bierdeman Paper Box Co., The, 361 W. Superior St., Chicago, Ill.
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Bird & Son, Inc., E. Walpole, Mass.
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Bischoff, Ernst, Co., Inc., 50 E. 42nd St., New York 17, N. Y.
Bisler, G. A., Inc., 5th & Brown Sts., Phila. 23, Pa.
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Blum, Emery & Co., Inc., 251 Fifth Ave., New York, N. Y.
Blum Folding Paper Box Co., Inc., 79 Bogart St., Bklyn 6, N. Y.
Blumenthal, Margaret, 10 W. 93rd St., New York, N. Y.
Boldt Bag Co., The, P. O. Box 2064, Houston 1, Texas
Bolta Co., The, 151 Canal St., Lawrence, Mass.
Bond Crown & Cork Co., Div. of Continental Can Co., Inc., 16th & Locust Sts., Wilmington, Del.
Bones & Mayer, 3915 Powelton Ave., Phila., Pa.
Boonton Molding Co., 326 Myrtle Ave., Boonton, N. J.
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Bowser-Morner Testing Laboratories, 141 Bruen St., Dayton 1, Ohio
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Box Shop, Inc., 373 Lexington Ave., New Haven, Conn.
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Bradner Smith & Co., 333 S. Desplaines St., Chicago, Ill.
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Brass Goods Mfg. Corp., 345 Eldert St., Bklyn, N. Y.
Braun, W., Co., 300 N. Canal St., Chicago, Ill.
Breen, Frederick Murray, Inc., 6 E. 45th St., New York, N. Y.
Breyer Molding Co., 24 N. Racine Ave., Chicago, Ill.
Brick & Ballerstein, 153 E. 24th St., New York, N. Y.
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Bridgeport Testing Laboratory, Inc., 675 Knowlton St., Bridgeport, Conn.
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Brockway Glass Co., Inc., 1047 Seventh Ave., Brockway, Pa.
Brogan, Byard F., 805 Sansom St., Phila., Pa.
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Burrows Paper Corp., Little Falls, N. Y.
Burt, F. N., Co., Inc., 514 Seneca St., Buffalo, N. Y.
Burt Machine Co., 401–3 E. Oliver St., Baltimore, Md.
Burton Mfg. Co., 3855 N. Lincoln Ave., Chicago, Ill.
Buser Corp., P. O. Box 2020, Paterson, N. J.
Bushwick Can Co., Inc., 723 Henry St., Bklyn, N. Y.
Butterfield, T. F., Inc., 56 Rubber Ave., Naugatuck, Conn.
Butterfield-Barry Co., Inc., 174–8 Hudson St., New York, N. Y.
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C

Cadillac Can Co., Mary St., Mt. Clemens, Mich.
Caldwell Products, Inc., 142 W. 24th St., New York, N. Y.
California Ink Co., Inc., The, 545 Sansome St., San Francisco, Calif.
California Pacific Plastic Co., 2225 Sunset Blvd., Los Angeles, Calif.
California Plastic Moulding Co., 1702 E. 61st St., Los Angeles, Calif.
California Plastics Co., 580 Market St., San Francisco, Calif.
California Testing Laboratories, Inc., 1429 Santa Fe Ave., Los Angeles, Calif.
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Calvert Lithographing Co., 2100 Grand River Ave., Detroit 1, Mich.
Cambridge Instrument Co., Inc., 3732 Grand Central Terminal, New York, N. Y.
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Cameo Die and Label Co., 154 W. 14th St., New York 11, N. Y.
Cameron Machine Co., 61 Poplar St., Bklyn 2, N. Y.
Campbell Box & Tag Co., 903 S. Main St., South Bend, Ind.
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Can Manufacturers Institute, 60 E. 42nd St., New York, N. Y.
Cans, Inc., 3217 W. 47th Place, Chicago, Ill.
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Capitol Paper Box Co., Inc., 1300 6th St., N. Bergen, N. J.
Capitol Printing Ink Co., Inc., 806 Channing Pl., N. E., Washington, D. C.
Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y.
Carbin Bottle Cap Corp., 1155 Manhattan Ave., Bklyn, N. Y.
Cardboard Manufacturers Assn., 122 E. 42nd St., New York, N. Y.
Cardinal Corp., The, Evansville, Ind.
Carlson Autopress Corp., Rockledge, Pa.
Carlson, John P., Inc., 420 Carroll St., Bklyn, N. Y.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carolina Paper Box Corp., Ft. of Gardner Ave., Charlotte, N. C.
Carpenter Container Corp., 137–147 41st St., Bklyn 32, N. Y.
Carr-Lowrey Glass Co., P. O. Box 356, Baltimore 3, Md.
Carter, Joseph, 520 N. Michigan Ave., Chicago 11, Ill.
Carter, William, Co., Highland Ave., Needham Heights, Mass.
Carthage Paper Makers, Inc., 1 Front St., Carthage, N. Y.
Carton Service, Inc., Franklin Ave., Shelby, Ohio
Cartoning Machinery Co. (See U. S. Automatic Box Machinery Co., Inc.)
Casco Paper Box Co., Inc., 68 Cross Street, Portland, Me.
Casselman, T. & E. Inc., 356–362 W. 18th St., New York, N. Y.
Catalin Corp., 1 Park Ave., New York 16, N. Y.
Cavalier Cap Corp., 507 Botetourt St., Norfolk, Va.
Celanese Plastics Corp., 180 Madison Ave., New York 16, N. Y.
Cellulose Packaging Corp., 235 E. 42nd St., New York, N. Y.
Cellulose Wadding Products, Inc., Garwood, N. J.
Celluplastic Corp., 50 Ave. L, Newark 5, N. J.
Cellusuede Products, Inc., 2107 Kishwaukee St., Rockford, Ill.
Cellutin Corp., The, Dwight St., Holyoke, Mass.,
Celon Co., The, 2034 Pennsylvania Ave., Madison 4, Wis.
Central Bag & Burlap Co., 4513 S. Western Blvd., Chicago, Ill.
Central Can Co., 2415 W. 19th St., Chicago 8, Ill.
Central Can Co., Inc., 1104–1110 Santa Fe, Kansas City 7, Mo.
Central Carton Co., 920 Summer St., Cincinnati, Ohio
Central Die Casting & Mfg. Co., 2935 W. 47th St., Chicago, Ill.
Central Fibre Products Co., 111 W. Washington St., Chicago, Ill.
Central Lithograph Co., The, 113 St. Clair Ave., N. E., Cleveland, Ohio.
Central Machine Works Co., 1234 Central Ave., N. E., Minneapolis, Minn.
Central Paper Box Co., 2911–43 Belleview Ave., Kansas City, Mo.
Central Paper Co., Manitowoc St., Menasha, Wis.
Central Paper Corp., Muskegon, Mich.
Central Process Corp., 1401 S. Circle Ave., Forest Park, Ill.
Central States Paper & Bag Co., 2600 N. Broadway, St. Louis 6, Mo.
Central Waxed Paper Co., 5659 W. Taylor St., Chicago, Ill.
Century Ribbon Mills, 80 Madison Ave., New York, N. Y.
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Champion Paper & Fibre Co., The, Hamilton, Ohio
Champlain Co., Inc., 636 11th Ave., New York 19, N. Y.
Chase, H. & L., 267 Atlantic Ave., Boston, Mass.
Chase Bag Co., 309 W. Jackson Blvd., Chicago, Ill.
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Chaspec Mfg. Co., 295 Lafayette St., New York 12, N. Y.
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Chemaco Corp., Berkeley Hgts., N. J.
Chemical Color & Supply Co., Div. General Printing Ink Corp., 547 S. Clark St., Chicago, Ill.
Chemical Paper Mfg. Co., Jackson St., Holyoke, Mass.
Chemical Plastics, Inc., 7301 W. Lake St., St. Louis Park, Minneapolis, Minn.
Cheron, Pierre J., 65 Locust St., Stratford, Conn.
Chesapeake Can Co., Inc., Crisfield, Md.
Chesapeake Paper Board Co., The, Baltimore, Md.
Chicago Cardboard Co., 670 Washington Blvd., Chicago 6, Ill.

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Chicago Carton Co., 4200 S. Crawford Ave., Chicago 32, Ill.
Chicago Die Mold Mfg. Co., 1735 Diversey Pkwy., Chicago, Ill.
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Chicago Label & Box Co., 312 N. May St., Chicago, Ill.
Chicago Molded Products Corp., 1020 N. Kolmar Ave., Chicago 51, Ill.
Chicago Paper Co., 801 So. Wells St., Chicago 7, Ill.
Chicago Plastic Mfg. Co., 4029 W. Kinzie St., Chicago, Ill.
Chicago Printed String Co., 2320 Logan Blvd., Chicago, Ill.
Chipman, Richmond Lane, Jr., 1 Brunswick Rd., Montclair, N. J.
Chirpe, W. Rodney, 185 N. Wabash Ave., Chicago, Ill.
Chisholm-Ryder Co., Inc., New Way Div., Hanover, Pa.
Cinch Mfg. Corp., 2335 W. VanBuren St., Chicago, Ill.
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Cincinnati Molding Co., 2037 Florence Ave., Cincinnati 6, Ohio
Cin-Made Corp., The, 3rd & Eggleston Aves., Cincinnati 2, Ohio
Claff, M. B. & Sons, Inc., 31 West St., Randolph, Mass.
Claremont Waste Mfg. Co., 169 Main St., Claremont N. H.
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Clark, J. L., Mfg. Co., Rockford, Ill.
Clark Box Co., The, 436 Main St., Danbury, Conn.
Clark Stek-O Corp., 1631 Dewey Ave., Rochester 13, N. Y.
Clarke Can Co., 12th & Fitzwater St., Phila., Pa.
Clarke, Rene, 247 Park Ave., New York, N. Y.
Cleaveland Lab. & Mfg. Co., Inc., Holland Ave., Peapack, N. J.
Cleveland Container Co., The, 10630 Berea Rd., Cleveland, Ohio
Cleveland Lathe & Machine Co., 5511 Euclid Ave., Cleveland 3, Ohio
Cleveland Plastics, Inc., 1611 E. 21st St., Cleveland, Ohio
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Climax Mfg. & Molding Corp., 315 Reynolds Place, S. W., Canton, Ohio
Clogston Paper Box Co., 102 Hill St., New Haven, Conn.
Clover Box & Mfg. Co., Inc., 818 E. 140th St., New York 54, N. Y.
Clover Leaf Paint & Varnish Corp., 43-43 Vernon Blvd., Long Island City, N. Y.
Coated & Processed Paper Assn., 1002 Union Trust Bldg., Providence, R. I.
Collapsible Tube Manufacturers Assn., 19 W. 44th St., New York, N. Y.
Collura, Francesco, 1 E. 53rd St., New York, N. Y.
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Coloroid Co., Inc., W. 58th & Walworth, Cleveland, Ohio
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Columbia Specialty Co., Inc., 6301 Eastern Ave., Baltimore, Md.
Columbus Coated Fabrics Corp., 1280 N. Grant Ave., Columbus 16, Ohio
Columbus Laboratories, The, 31 N. State St., Chicago, Ill.
Columbus Paper Box Co., Inc., 344 W. Town St., Columbus, Ohio
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Comet Envelope & Paper Co., Inc., 5 E. 17th St., New York, N. Y.
Commercial Paste Co., The, 504 Buttles Ave., Columbus 8, Ohio
Commonwealth Plastic Co., 140 Adams St., Leominster, Mass.
Compo-Site Plastic Division, E. S. Lowe Co., Inc., 85 5th Ave., Paterson 4, N. J.
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Condon, Frank, 25 Broadway, New York, N. Y.
Conneaut Can Co., The, Whitney Road, Conneaut, Ohio
Connecticut Hard Rubber Co., 407 East St., New Haven, Conn.
Connecticut Plastic Products Co., 124 N. Elm St., Waterbury, Conn.
Consolidated Box Co., Inc., 3302 N. Armenia Ave., P. O. Box 4341, Tampa, Fla.
Consolidated Fruit Jar Co., New Brunswick, N. J.
Consolidated Lithographing Corp., 1013 Grand St., Bklyn 6, N. Y.
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Consolidated Paper Box Co., 6 Vernon St., Somerville, Mass.
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Container Corporation of America, 111 W. Washington St., Chicago 2, Ill.
Container Equipment Corp., 204 Riverside Ave., Newark 4, N. J.
Container Manufacturers Guild, 450 Seventh Ave., New York, N. Y.
Container Testing Laboratories, Inc., 45 E. 22nd St., New York, N. Y.; 205 W. Wacker Drive, Chicago, Ill.; 151 New Montgomery St., San Francisco, Calif.
Continental Bag Specialty Corp., 601 W. 26th St., New York, N. Y.
Continental Can Co., Inc., 100 E. 42nd St., New York 17, N. Y.
Continental Container Corp. (See Scandore Paper Box Co.)
Continental Folding Paper Box Co., Inc., Richfield, N. J.
Continental Lithograph Corp., 952 E. 72nd St., Cleveland, Ohio
Continental Paper Co., Industrial Ave., Ridgefield Park, N. J.
Continental Paper Products Co., Box 4116, South Denver Station, Denver 9, Colo.
Continental Plastics Corp., 314 W. Erie St., Chicago, Ill.
Cooper, D. C. Co., 20 E. 8th St., Chicago 16, Ill.
Cooper, R. G., 7376 Grand River Ave., Detroit, Mich.
Cooperative Food Distributors of America, 506 Shoreham Bldg., Washington, D. C.
Cordiano Can Co., Inc., 20 Grand Ave., Bklyn, N. Y.
Cork Institute of America, 25 W. 43rd St., New York, N. Y.
Corn Products Refining Co., 17 Battery Place, New York, N. Y.
Cornell Wood Products Co., 230 N. Michigan Ave., Chicago, Ill.
Corning Glass Works, Corning, N. Y.
Corro-Lith Corp., 44-35 21st St., Long Island City, N. Y.
Cottonluxe Mfg Co., 597 E. 137th St., New York 54, N. Y.
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Coughlin Mfg. Co., 697–699 E. 132nd St., New York 54, N. Y.
Courier Journal Job Printing Co., 324 W. Liberty, Louisville, Ky.
Cournand, E. L., Inc., 285 Madison Ave., N. Y.
Cowles, Harold A., Box & Display Co., 163 St. Paul St., Rochester, N. Y.
Coy Paper Co., Claremont, N. H.
Craftsman Label Co., 120 W. 20th St., New York, N. Y.
Craven-Whittaker Co., 215 Georgia Ave., Providence, R. I.
Crawford, John W., Co., 160 Varick St., New York, N. Y.
Creative Printmakers Group, 14 W. 17th St., New York 11, N. Y.
Crescent Box Corp., 621 E. Erie St., Phila., Pa.
Crescent Burlap Bag Co., 4124 Toulouse St., New Orleans 6, La.
Crescent Ink & Color Co. of Pa., 464 N. 5th St., Phila. 23, Pa.
Criterion Paper & Twine Co., 799 Washington St., New York, N. Y.
Croasdale & De Angelis, Eagle & Lawrence Rds., Upper Darby, Pa.
Croce, Isabel M., 137 E. 38th St., New York, N. Y.
Crocker Union, 735 Harrison St., San Francisco, Calif.
Crompton-Adelphia, John Corp., 145 W. Columbia Ave., Phila., Pa.
Cromwell Paper Co., The, 4801 S. Whipple St., Chicago, Ill.
Crook Paper Box Co., 110–120 E. 10th Ave., N., Kansas City, Mo.
Cross Paper Products Corp., 2587–2597 3rd Ave., New York 51, N. Y.
Crowell Corp., The, Yorklyn, Del.
Crown Can Co., Erie Ave., Phila., Pa.
Crown Cork & Seal Co., Eastern Ave. & Kresson St., Baltimore, Md.
Crown Manufacturers Assn. of America, 218 Munsey Bldg., Washington, D. C.
Crown-Willamette Paper Co., 343 Sansome St., San Francisco, Calif.
Crown Zellerbach Corp., 343 Sansome St., San Francisco, Calif.
Crunden, Martin Mfg. Co., 2nd & Gratiot St., St. Louis, Mo.
Cruver Mfg. Co., 2456–60 Jackson Blvd., Chicago, Ill.
Cruze, Charles, 2008 W. 7th St., Los Angeles 5, Calif.
Crystal Bag Co., Chickamauga, Ga.
Crystal Tissue Co., Middletown, Ohio
Crystal Transparent Corp., 136 W. 21st St., New York 11, N. Y.
Crystal Tube Corp., 538 S. Wells St., Chicago, Ill.
Cummer Graham Co., Paris, Texas
Cup & Container Institute, 1790 Broadway, New York, N. Y.
Cupples Co., 7th & Spruce Sts., St. Louis, Mo.
Cupples-Hesse Corp., 4175 N. Kingshighway, St. Louis 15, Mo.
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D

D & W Tool Co., 601 E. Broadway, Glendale, Calif.
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Danbury Square Box Co., The, P. O. Box 729, Danbury, Conn.
Daniels Mfg. Co., Rhinelander, Wis.
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Davies Can Co., The, 872 E. 72nd St., Cleveland, Ohio
Davies, Harry, Molding Co., 1428 N. Wells St., Chicago, Ill.
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Davison Chemical Corp., The, 20 Hopkins Place, Baltimore 3, Md.
Dayton Insulating Molding Co., 207 E. 6th St., Dayton, Ohio
Decorated Containers Co., 1478 Chestnut Ave., Hillside, N. J.
Decotone Products, Div. Fitchburg Paper Co., 193 Kimball St., Fitchburg, Mass.
Deerfield Glassine Co., Monroe Bridge, Mass.
Deisroth, W. H., Co., Inc., S. E. Cor. 3rd & Cambria Sts., Phila., Pa.
Dejonge, Louis & Co., 345 Broadway, New York, N. Y.
Delman Paper Box Co., The, 419 W. 5th St., Cincinnati, Ohio
Delta Paper Boxes, Inc., 34 Hubert St., New York, N. Y.
DeNina, James Andrew, 509 5th Ave., New York 17, N. Y.
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Densen-Banner Co., Richfield Park, N. J.
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Designers for Industry, Inc., 2915 Detroit Ave., Cleveland 13, Ohio
Designs, Inc., 2027 83rd St., N. Bergen, N. J.
Desky, Donald, 630 5th Ave., New York, N. Y.
Detecto Scales, Inc., 1 Main St., Bklyn, N. Y.
Detroit Macoid Corp., 12345 Cloverdale Ave., Detroit, Mich.
Detroit Sulphite & Paper Co., 9125 W. Jefferson Ave., Detroit 17, Mich.
Detroit Testing Laboratory, The, 554 Bagley Ave., Detroit, Mich.
Dewey & Almy Chemical Co., 62 Whittemore Ave., Cambridge 40, Mass.
Dexter, C. H. & Sons, Inc., 100 Canal, Windsor Locks, Conn.
Dexter Folder Co., 330 W. 42nd St., New York, N. Y.
Diagraph-Bradley Stencil Machine Corp., 3755 Forest Park Blvd., St. Louis, 8, Mo.
Diamond Paper Box Co., Inc., 30 Somerton St., Rochester, N. Y.
Diamond Paper Mills Co., Inc., 205 E. 42nd St., New York, N. Y.
Dickerman Box Co., 36 Landsdowne St., Cambridge, Mass.
Diemolding Corp., Canastota, N. Y.
Dillon-Beck Mfg. Co., 103 Montgomery Ave., Irvington, N. J.
Dimco Plastics, 207 E. 6th St., Dayton 1, Ohio
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District of Columbia Paper Mills, Inc., Potomac & K Sts., N. W., Washington, D. C.
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E

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Economy Novelty & Printing Co., 225 W. 39th St., New York 18, N. Y.
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F

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G

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Insulation Mfg. Co., Inc., 11 New York Ave., Bklyn, N. Y.
Insulation Products Co., 504 N. Richland St., Pittsburgh 8, Pa.
In-Tag, Div. of Interchemical Corp., 75 Varick St., New York, N. Y.
Interlake Chemical Corp., 1900 Union Commerce Bldg., Cleveland 14, Ohio
International Folding Paper Box Co., 2029 83 St., N. Bergen, N. J.
International Mailing Tube & Wrapper Co., 29-05 Review Ave., Long Island City, N. Y.
International Molded Plastics, Inc., 43–83 W. 35th St., Cleveland, Ohio
International Paper Box Machine Co., The, 315 Main St., Nashua, N. H.
International Paper Co., 220 E. 42nd St., New York, N. Y.
International Paper Products, Div. of International Paper Co., 220 E. 42nd St., New York, N. Y.
International Plastic Corp., 10 Park Place, Morristown, N. J.
International Printing Ink, Div. of Interchemical Corp., 350 Fifth Ave., New York 1, N. Y.
International Staple & Machine Co., Penn & Jefferson Sts., Clifton Heights, Pa.
Interstate Bag Co., Walden, N. Y.
Interstate Folding Box Co., Middletown, Ohio
Irvington Varnish & Insulator Co., 6 Argyle Terrace, Irvington, N. J.
Island Equipment Corp., 101 Park Ave., New York 17, N. Y.
Ivers-Lee Co., 215 Central Ave., Newark 4, N. J.

J

J. L. Paper Box Co., North Attleboro, Mass.
Jackson, McStay, Co., 840 N. Michigan Ave., Chicago, Ill.
Jamieson, C. E., & Co., 1962 Trombly, Detroit, Mich.
Jamison, H., 71 E. Sunrise Highway, Freeport, L. I., N. Y.
Jarrell, B. C., & Co., Humboldt, Tenn.
Jay Advertising Co., Lincoln Highway, W. Lancaster, Pa.
Jay, Norbert, 350 Fifth Ave., New York 1, N. Y.
Jaypaco Co., 405 E. 4th St., New York, N. Y.
Jeffrey Mfg. Co., The, 828–99 N. 4th St., Columbus 16, Ohio

Jensen, Gustav, 16 E. 48th St., New York, N. Y.
Jiffy Mfg. Co., 360 Florence Ave., Hillside, N. J.
Johnson, Charles Ebey & Co., 10th St. at Lombard, Phila., Pa.
Johnston Paper Co., The, 2060 Reading Road, Cincinnati, Ohio
Johnston Tin Foil & Metal Co., The, 6100 S. Broadway, St. Louis 11, Mo.
Jones, E. Willis, 333 N. Michigan Ave., Chicago, Ill.
Jones Dabney Co., Louisville, Ky.
Jones, R. A. Co., Covington, Ky.
Jones, Jesse, Paper Box Co., 1025 Vine St., Phila., Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., 3rd Ave. & Ross Sts., Pittsburgh 30, Pa.

K

K. C. Plastic Fabricators, 1529 Cherry St., Kansas City, Mo.
Kalamazoo Paper Box Co., 389 S. Pitcher St., Kalamazoo 99, Mich.
Kalamazoo Vegetable Parchment Co., Parchment, Kalamazoo 99, Mich.
Kampa Mfg. Co., 12132 W. Capitol Drive, Milwaukee, Wis.
Kaplan Textile & Prods., Inc., 561 Fifth Ave., New York 17, N. Y.
Karasz, Ilonka, Gage Hill, Brewster, N. Y.
Kaumagraph Co., 14th & Poplar Sts., Wilmington, Del.
Kay Displays, Inc., 9 E. 40th St., New York 16, N. Y.
Kayton, Robert, Displays Inc., 127 W. 26th St., New York, N. Y.
Keasbey & Mattison, Butler Pike, Ambler, Pa.
Keeler Brass Co., 955 Gottfried Ave., S. W., Grand Rapids, Mich.
Keller-Dorian Corp., 350 Fifth Ave., New York 1, N. Y.
Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago, Ill.
Kelly, E. J., Co., 1807 N. Pitcher St., Kalamazoo, Mich.
Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind.
Kent, Percy, Bag Co., Inc., 320 Broadway, New York, N. Y.
Kentucky Paper Box Co., 117 N. 6th St., Louisville, Ky.
Keolyn Plastics Co., 2731 N. Pulaski Rd., Chicago, Ill.
Keratol Co., Stamford, Conn. (See Atlas Powder Co., Zapon Div.)
Ketcham, Howard, Inc., 607 5th Ave., New York, N. Y.
Ketterlinus Lithographic Mfg. Co., 4 & Arch Sts., Phila., Pa.
Keyes Fibre Co., Upper College Ave., Waterville, Me.
Keystone Bag & Burlap Co., 854 N. Prince St., Lancaster, Pa.
Keystone Box Co., 28th & Smallman Sts., Pittsburgh, Pa.
Keystone Cap Co., Columbia, Pa.
Keystone Fibre Drum Co., Oliver Bldg., Pittsburgh, Pa.
Keystone Specialty Co., 1373½ Cove Ave., Lakewood, Cleveland, Ohio
Kidder Press Co., Inc., Dover, N. H.
Kiefer, Karl, Machine Co., 919 Martin St., Cincinnati 2, Ohio
Kiernan-Hughes Co., Ninth & Brunswick Sts., Jersey City, N. J.
Kilgore Mfg. Co., The, Plastics Div., 200 E. Broadway, Westerville, Ohio
Kimberly-Clark Corp., Neenah, Wis.
Kimble Glass Co., Vineland, N. J.
Kindred, MacLean & Co., Inc., 43-01 22nd St., Long Island City 1, N. Y.
King Bag Co., 125 E. Front St., Cincinnati, Ohio
King Mfg. Co., 22 Main St., Cincinnati, Ohio
King Plastic Corp., Speer Blvd. & Lincoln St., Denver, Colo.
Kingman, E. B., Co., 96 Exchange St., Leominster, Mass.
Kirby-Cogeshall-Steinau Co., 606 E. Clybourne St., Milwaukee, Wis.
Kirk, F. J. Molding Co., 140 Brook St., Clinton, Mass.
Klein, A., & Co., Inc., 113 W. 17th St., New York, N. Y.
Kline, Leon M., 130 W. Maple St., York, Pa.
Kling Bros. Eng. Works, 1320 N. Kostner Ave., Chicago, Ill.
Knoche, Lucille, 664 N. Michigan Ave., Chicago, Ill.
Knoedler, A., Co., 651 High St., Lancaster, Pa.
Knowlton, M. D., Co., 57 Clarissa St., Rochester, N. Y.
Koch, Carl Peter, 35 E. Wacker Drive, Chicago, Ill.
Koehl, William, Co., The, 1020 Hulbert Ave., Cincinnati 14, Ohio
Kohl & Madden Printing Ink Co., 713 Plymouth Court, Chicago, Ill.
Koodiu-Lapow Associates, 18 E. 41st St., New York, N. Y.
Koppel, E. Leonard, 40 E. 49th St., New York 17, N. Y.
Koster, Louis H., 143 E. 40th St., New York, N. Y.
Kraft Bag Corp., 630 5th Ave., New York, N. Y.
Kraft Paper Assn., 122 E. 42nd St., New York, N. Y.
Krause, Richard M., Inc., 52 E. 19th St., New York 3, N. Y.
Kress, F. J., Box Co., 1—28th St., Pittsburgh, Pa.
Kroeck Paper Box Co., 1701 W. Superior St., Chicago, Ill.
Kuhn & Jacob Moulding & Tool Co., 1200 Southard St., Trenton 8, N. J.
Kupfer Bros. Co., 2 Astor Place, New York 3, N. Y.
Kurz-Kasch, Inc., 1421 S. Broadway, Dayton, Ohio

L

L-A Paper Box Factory, 2615 E. 12th St., Los Angeles, Calif.
Label Mfrs. National Assn., 1700 Eye St., N. W., Washington, D. C.
LaBoiteaux Co., Inc., The, 2985 Madison Rd., Cincinnati, Ohio
Lakso Co., The, Box 257, Fitchburg, Mass.
Lambooy Label & Wrapper Co., 2129 Portage St., Kalamazoo, Mich.
Laminating Corp., 1313 W. Randolph St., Chicago, Ill.
Laminoid, Inc., 2125 83rd St., N. Bergen, N. J.
Lamson Corp., 1003 Lamson St., Syracuse 1, N. Y.
Landowne, J., Co., The, 561 Grand Ave., Bklyn, N. Y.
Lanfare Molded Products, 1519 Freeman St., Toledo, Ohio
Langston, Samuel M., Co., 1930 S. 6th St., Camden, N. J.
Lansky Die Cutting Co., 194 Greene St., New York, 12, N. Y.
Lapin Products, Inc., 164 Delancy St., Newark, 5, N. J.
Latimar, E. Jr. & Co., 126 N. 4th St., Phila. 5, Pa.
Laucks Laboratories, Inc., 911 Western Ave., Seattle, Wash.
Lauxite Corp., 116 S. Niagara St., Lockport, N. Y.
LaWall & Harrisson, 1921 Walnut St., Phila. 3, Pa.
Lawless Bros. Paper Mills, Inc., E. Rochester, N. Y.
Lawson, Jacob, Bag Co., 264 Water St., New York, N. Y.
Lebanon Paper Box Co., 10th & Willow Sts., Lebanon, Pa.
LeComte & Co., Inc., 147 41st St., Bklyn, N. Y.
Lehmann Printing & Lithographing Co., 400 4th St., San Francisco 7, Calif.; 810 S. Spring St., Los Angeles 14, Calif.
Leigh Banana Case Co., Ellentown, S. C.
Lengsfield Bros., Inc., 1101 Tchoupitoulas St., New Orleans, La.
Lenoir Pad & Paper Co., Lenoir, N. C.
Leominster Paper Box Co., 43 Granite St., Leominster, Mass.
LePage's, Inc., 144 Essex Ave., Gloucester, Mass.
Lev-A-Lift Co., The, 277 Broadway, New York 7, N. Y.
Levey, Frederick H., Co., Inc., 41 E. 42nd St., New York, N. Y.
Levey, H. A., Laboratories, 8131 Oleander St., New Orleans, La.
Levitan Mfg. Co., 236 Greenpoint Ave., Bklyn, N. Y.
Levy, Maurice, 120 W. 42nd St., New York, N. Y.
Lewellen Mfg. Co., Columbus, Ind.
Lewis, Ben, 16 E. 52nd St., New York, N. Y.
Lewis-Shephard, 117 Walnut St., Watertown, Mass.
Libby Glass Mfg. Co., 100 Ash St., Toledo, Ohio
Liberty Can & Sign Co., 303 N. Plum St., Lancaster, Pa.
Liberty Glass Co., Sapulpa, Okla.
Liberty Paperboard Co., The, Steubenville, Ohio
Lily-Tulip Cup Corp., 122 E. 42nd St., New York, N. Y.
Lincoln Can Mfg. Corp., 4012 2nd Ave., Bklyn, New York
Lindenhurst Mfg. Co., Inc. 175 S. Smith St., Lindenhurst, N. Y.
Lindley Box & Paper Co., 1747 W. 2nd St., Marion, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Liquid Carbonic Corp., The, 3100 S. Kedzie Ave., Chicago 23, Ill.
Litho Can Corp., 840 Cooper St., Camden, N. J.
Lithographers Finishing Co., Inc., 224 Centre St., New York, N. Y.
Lithographers National Assn., 420 Lexington Ave., New York, N. Y.
Lithographic Technical Foundation, 220 E. 42nd St., New York, N. Y.
Little, Arthur D., Inc., 30 Charles River Rd., Cambridge, Mass.
Little Falls Paper Co., Inc., Newburgh, N. Y.
Livingston & Co., Inc., 468 W. Broadway, New York, N. Y.
Logan Co., 1115 Franklin, Louisville, Ky.
Lone Star Bag & Bagging Co., Houston, Texas
Lord Baltimore Press, 595 Madison Ave., New York 22, N. Y.
Loroco Industries, Inc., Benson & Penn R.R., Reading, Ohio
Lorscheider-Schang Co., Inc., The, 140 N. Fitzhugh St., Rochester, N. Y.
Los Angeles Testing Laboratory, 1300 S. Los Angeles St., Los Angeles, Calif.
Lowe Paper Co., River St., Ridgefield, N. J.
Lowery & Schwartz, Inc., 20 Van Dam St., New York, N. Y.
Lowman Folding Box Corp., 156 Solar St., Syracuse, N. Y.
Lusteroid Container Co., Inc., 10 W. Parker Ave., South Orange, N. J.
Lynch Mfg. Corp., Columbus Ave., Defiance, Ohio

M

M & R Mfg. Co., 48 Blanche, Mansfield, Ohio
Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J.
Mac Sim Bar Paper Co., Otsego, Mich.
Mac Andrews & Forbes Co., 3rd & Jefflers Sts., Camden, N. J.
Mack Molding Co., 102 Main St., Wayne, N. J.
Maderite Paper Box Co., 95 Main St., Winsted, Conn.
Maffitt, Howard C., 522 11th St., Des Moines, Iowa
Magill-Weinsheimer Co., 1320–1334 S. Wabash Ave., Chicago 5, Ill.
Maine Potato Bag Co., Caribou, Me.
Majestic Metal Specialty, Inc., 576 5th Ave., New York, N. Y.
Makalot Corp., 262 Washington St., Boston 9, Mass.
Makdon Co., 438 W. 37th St., New York 18, N. Y.
Makowsky, J., Corp., 438 W. 37th St., New York, N. Y.
Manchester Board & Paper Co., Inc., Canal Nr. Hull, Richmond 9, Va.
Manders Co., Inc., The, 31 W. 27th St., New York, N. Y.
M & R Mfg. Co., 48 Blanche St., Mansfield, Ohio
Manhattan Paste & Glue Co., Inc., 425 Greenpoint Ave., Bklyn, N. Y.
Mansell, A. Vivian & Co., Ltd., 230 5th Ave., New York, N. Y.
Manufacturers Can Co., 3848 W. Lake St., Chicago, Ill.
Manufacturers Printing Ink Corp., 1 Main St., Bklyn, N. Y.
Marathon Corp., Menasha, Wis.
Marblette Corp., 3721 30th St., Long Island City, N. Y.
Marco Chemicals, Inc., Sewaren, N. J.
Marconetti, A. E., Inc., 11 W. 42nd St., New York, N. Y.
Markem Machine Co., 50 Emerald St., Keene, N. H.
Market Printing Co., 129 N. Halsted St., Chicago, Ill.
Marking Devices Association, 134 N. La Salle St., Chicago 2, Ill.
Marks Chemical Works, 20 West St., New York 10, N. Y.
Marsh, George, 603 Statler Bldg., Boston, Mass.
Marsh Stencil Machine Co., 100 Marsh Bldg., Belleville, Ill.
Martial & Scull, 1 E. 53rd St., New York 22, N. Y.
Martindell Molding Co., Olden at 6th St., Ewing Twp., Trenton, N. J.
Marvellum Co., The, 28 Appleton St., Holyoke, Mass.
Marvil Package Co., Laurel, Del.
Maryland Container Co., 1515 Russell St., Baltimore, Md.
Maryland Glass Corp., Morrell Park Station, Baltimore, Md.
Maryland Paper Box Co., Leadenhall & Ostend Sts., Baltimore 30, Md.
Maryland Plastics, Inc., East Central Ave., Federalsburg, Md.
Mason Box Co., The, Attleboro Falls, Mass.
Mason Can Co., Dexter Rd., E. Providence, R. I.
Mason Envelope Co., 644 Broadway, New York, 12, N. Y.
Mason, F. E., & Sons, Batavia, N. Y.
Mason, Thomas Co., Inc., Fairfield Ave., Stamford, Conn.
Master Craftsmen of the Set-up Paper Box Industry, 1106 Liberty Trust Bldg., Phila. 7, Pa.
Master Package Corp., The, Owen, Wis.
Master Plastic Molding Corp., 1609 N. Broadway, St. Louis, Mo.
Master Tool & Die Makers, 1170 Broadway, New York, N. Y.
Mathews Conveyer, 166 10th St., Ellwood City, Pa.
Matthews, James H. & Co., 3942 Forbes St., Pittsburgh, Pa.
Matthias Paper Corp., 165 W. Berks St., Phila. 22, Pa.
Maurer, Sascha A., 480 Lexington Ave., New York, N. Y.
Maxson Automatic Machinery Co., 23 Broad St., Westerly, R. I.
Mayer, Fred A., 2 Ellwood St., New York, N. Y.
McClandlish Lithograph Corp., Roberts Ave. & Stokley St., Phila., Pa.
McClintock Corp., The, 1550 Vernon St., Harrisburg, Pa.
McCoy Label Co., Montgomery & Commercial Sts., San Francisco 11, Calif.
McCoy Paper Converters, 3rd & Huntingdon Sts., Phila. 33, Pa.
McDonald Mfg. Co., 544 E. 31st St., Los Angeles, Calif.
McEwan Bros., Inc., Whippany, N. J.
McGill Lithograph Co., 501 Seventh Ave., S., Minneapolis, Minn.
McGuire, Walter, 227 Franklin St., Bklyn, N. Y.
McInerney Plastics Co., 655 Godfrey Ave., S. W., Grand Rapids, Mich.
McIntyre Bros. Paper Co., Inc., Fayetteville, N. Y.
McLaurin-Jones Co., Mill St., Brookfield, Mass.
Mechanical Institute, 115 Cedar St., Boonton, N. J.
Mehl Mfg. Co., 2351 Ferguson Rd., Cincinnati 5, Ohio
Melind, Louis, 362 W. Chicago, Chicago, Ill.
Meier, Joshua, 36 E. 10th St., New York, N. Y.
Meisel Press Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Meissner Mfg. Co., Bellmont & 7th St., Mt. Carmel, Ill.

Mele Mfg. Co., 150 W. 22nd St., New York, N. Y.
Melvina Can Co., 59-24 57th Drive, Maspeth, L. I., N. Y.
Mente & Co., Inc., 12th Floor, Q & C Bldg., New Orleans, La.
Mercer-Robinson Co., Inc., 30 Church St., New York 7, N. Y.
Mergenthaler Linotype Co., 29 Ryerson St., Bklyn, N. Y.
Merit Display Cards Co., 120 E. 11th St., New York, N. Y.
Merrick Scale Mfg. Co., Summer St., Passaic, N. J.
Merrick Transparent Products, 10-09 43rd Ave., Long Island City, N. Y.
Metal Marker Mfg. Co., 1380 E. 40th St., Cleveland, Ohio
Metal Specialty Co., The, Este Ave. & B. & O. R.R., Winton Pl., Cincinnati, Ohio
Metasap Chemical Co., First & Essex, Harrison, N. J.
Meyer, Frank C., Co., 271 Lexington Ave., Bklyn, N. Y.
Meyer, Joseph H., Bros., 220 25th St., Bklyn, N. Y.
Meyercord Co., The, 5323 W. Lake St., Chicago 44, Ill.
Micamold Radio Corp., 1087 Flushing Ave., Bklyn, N. Y.
Michigan Carton Co., 79 E. Fountain St., Battle Creek, Mich.
Michigan Lithographing Co., 1 Carlton Ave., S. E., Grand Rapids 6, Mich.
Michigan Molded Plastics, Inc., "G" & Baker Sts., Dexter, Mich.
Mico, Inc., Millerton, N. Y.
Middlesex Products Corp., 111 Putnam Ave., Cambridge, Mass.
Midland Bag Co., 5403 Bower Ave., Cleveland, Ohio
Midland Glue Products Co., 1478-88 Madison Ave., Detroit, Mich.
Mid-States Gummed Paper Co., 2515 S. Damen Ave., Chicago, Ill.
Mid-States Steel & Wire Co., Crawfordsville, Ind.
Midwest Molding & Mfg. Co., 319 Whipple St., Chicago, Ill.
Miehle Printing Press Mfg. Co., 14th & Damen Ave., Chicago, Ill.
Milk Cap Statistical Bureau, 1532 Lincoln Liberty Bldg., Phila., Pa.
Miller & Miller, 136 Marietta St., N. W., Atlanta, Ga.
Miller Paper Co., 80 Wooster St., New York 12, N. Y.
Miller Printing Machinery Co., 1117 Reedsdale, Pittsburgh, Pa.
Miller, Walter P., Co., Inc., 452 York Ave., Phila. 23, Pa.
Miller Wrapping & Sealing Machine Co., 18 S. Clinton St., Chicago, Ill.
Millhiser Bag Co., Richmond, Va.
Mill-O-Plast Co., 118 Walker St., New York, N. Y.
Mills, Elmer E., Corp., 812 W. Van Buren St., Chicago, Ill.
Milprint, Inc., 5th & Florida Sts., Milwaukee, Wis.
Milton, Geo. A., Can Co., Inc., 131-151 N. 14th St., Bklyn, N. Y.
Milwaukee Industrial Designers, 1422 E. Albion St., Milwaukee 2, Wis.
Milwaukee Label & Seal Co., 1027 N. Seventh St., Milwaukee 3, Wis.
Minerva Wax Paper Co., Minerva, Ohio
Minkoff & Rosenfield Bros., Inc., 557 DeKalb Ave., Bklyn, New York
Minneapolis Plastic Co., 2300 E. 31st St., Minneapolis, Minn.
Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.
Minnesota Plastics Corp., 366 Wacouta St., St. Paul, Minn.
Missouri Bag Co., 1206-14 N. Main St., St. Louis 6, Mo.
Mitchell-Rand Mfg. Co., 51 Murray St., New York, N. Y.
Mobile Paper Mill Co., Mobile, Ala.
Model Engraving Corp., 460 W. 34th St., New York, N. Y.
Modern Boxes, Inc., 4949 N. Pulaski Rd., Chicago 30, Ill.
Modern Containers, Inc., 1107 E. 8th St., Los Angeles 21, Calif.
Modern Equipment Corp., Defiance, Ohio
Modern Machine Corp., 323 Berry St., Bklyn, N. Y.
Modern Packages Co., 508 E. Bodley Ave., Memphis, Tenn.
Modern Plastic Co., 4641 Pacific Blvd., Los Angeles, Calif.
Modern Plastics Corp., North Shore Drive, Benton Harbor, Mich.
Modglin Co., 3809 Eagle Rock Blvd., Los Angeles, Calif.
Mohawk Valley Paper Co., Inc., Little Falls, N. Y.
Moist-R-Proof Container Co., 1960 Hayes St., San Francisco, Calif.
Mojonnier Bros. Co., 4601 W. Ohio St., Chicago, Ill.
Molded Insulation Co., 335 E. Price St., Phila. 44, Pa.
Molded Products Co., 4533 W. Harrison St., Chicago, Ill.
Molding Corp. of America, Inc., 40 Church St., Pawtucket, R. I.
Molitor-Box Co., 392 Florida St., Milwaukee, Wis.
Mono Containers Div., Continental Can Co., 349 Oraton, Newark 4, N. J.
Monoplastics, Inc., Old Branchville Rd., Georgetown, Conn.
Monsanto Chemical Co., Plastics Div., 600 Monsanto Ave., Springfield 2, Mass.
Mont, Ben, Papers, Inc., Mill St., Bennington, Vt.
Mooney & Mooney, Inc., 200 Wright St., Newark, N. J.
Morgan Bros., Richmond, Va.
Mor-Gan Laminating & Foliating Co., 30 E. 20th St., New York 3, N. Y.
Morrell, George Corp., Sherman Blvd., Muskegon Heights, Mich.
Morrill, Geo. H. Co., Div. General Printing Ink Corp., 100 Sixth Ave., New York, N. Y.
Morris Paper Mills, 135 S. LaSalle St., Chicago 3, Ill.
Moser Bag & Paper Co., 3041-55 E. 55th St., Cleveland, Ohio
Moser Paper Box Co., 4511 N. Euclid Ave., St. Louis, Mo.
Mosinee Paper Mills Co., Mosinee, Wis.
Motion Displays, Inc., 29 Ryerson St., Bklyn, N. Y.
Mott Carton & Paper Co., 2234 Eugenia St., St. Louis 3, Mo.
Moyer & Pratt, Inc., Lyons Falls, N. Y.
Muirson Label Co., Inc., 1085 Irving Ave., Bklyn, N. Y.
Muller-Munk, Peter, 1831 Murray Ave., Pittsburgh 17, Pa.
Mundet Cork Corp., Closure Div., 65 S. Eleventh St., Bklyn 11, N. Y.
Munson Bag Co., The, 1366 W. 117th St., Cleveland 7, Ohio
Murray & Scheiding, 151 E. 38th St., New York, N. Y.
Muskegon Paper Box Co., 997 W. Western Ave., Muskegon, Mich.
Myers, J. & P. B., Inc., 26 Exchange Place, Jersey City, N. J.

N

Nalco, Inc., 203 E. 18th St., New York 21, N. Y.
Na-Mac Products Corp., 1027 N. Seward St., Hollywood, Calif.
Narragansett Coated Paper Corp., 740 York Ave., Pawtucket, R. I.
Nash, Ben, Inc., 15 Gramercy Park, New York, N. Y.
Nash, Jim, 405 E. 54th St., New York, 22, N. Y.
Nashua Gummed & Coated Paper Co., 44 Franklin St., Nashua, N. H.
Nashua Package Sealing Co., Nashua, N. H.
Natick Box & Board Co., Natick, Mass.
National Adhesives, 270 Madison Ave., New York 16, N. Y.
National Assn. of Bottle Cap Mfrs. (Now Milk Cap Statistical Bureau), Nashua, N. H.
National Assn. of Display Industries, 710 W. Washington St., Chicago 6, Ill.
National Assn. of Food Chains, 726 Jackson Blvd., Washington, D. C.
National Assn. of Glue Mfrs., 55 W. 42nd St., New York, N. Y.
National Assn. of Mfrs., 14 W. 49th St., New York, N. Y.
National Assn. of Printing Ink Makers, 1440 Bway., New York, N. Y.
National Assn. of Sanitary Milk Bottle Closure Mfrs., 1532 Lincoln-Liberty Bldg., Phila., Pa.
National Bag Corp., 271 Madison Ave., New York, N. Y.
National Bread Wrapping Machine Co., 132 Birnie Ave., Springfield, Mass.
National Can Corp., 110 E. 42nd St., New York, N. Y.
National Canners Assn., 1739 H St., N. W., Washington, D. C.
National Canners Laboratory 711 Pennsylvania Ave., Pittsburgh, Pa.
National Casein Sales, 601 W. 80th St., Chicago, Ill.
National Collapsible Tube Co., 362 Carpenter St., Providence 9, R. I.
National Color Printing Co., Inc., The, 930 E. Monument St., Baltimore 2, Md.
National Confectioners Assn., 224 S. Michigan, Chicago, Ill.
National Consumer Retailer Council, 8 W. 40th St., New York, N. Y.
National Container Corp., 30-01 Review Ave., Long Island City 1, N. Y.
National Dehydrators Assn., 35 E. Wacker Dr., Chicago 1, Ill.
National Fibre Can & Tube Assn., 41 E. 42nd St., New York, N. Y.
National Folding Box Co., James & Alton Sts., New Haven 4, Conn.
National Industrial Advertisers Assn., 100 E. Ohio St., Chicago, Ill.
National Lock Co., 1902 7th St., Rockford, Ill.
National Metal Edge Box Co., 334 N. 12th St. Phila., Pa.
National Oil Products Co., 1st & Essex Sts., Harrison, N. J.
National Packaging Machinery Co. (See U. S. Automatic Box Machinery Co., Inc.)
National Paint, Varnish & Lacquer Assn., 1500 Rhode Island Ave., N. W., Washington, D. C.
National Paper Box Co., 20th St. & Tracy Ave., Kansas City, Mo.
National Paper Box Mfg. Co., 1346 N. Branch St., Chicago, Ill.
National Paper Box Manufacturers Assn., 1106 Liberty Trust Bldg., Phila., Pa.
National Paper Box Supplies Assn., P. O. Box 122, Summit, N. J.
National Paper Co., P. O. Box 1637, Atlanta 1, Ga.
National Plastics, Inc., 2330 McCalla Ave., Knoxville, Tenn.
National Printing & Engraving Co., 7 S. Dearborn St., Chicago, Ill.
National Process Co., 75 Varick St., New York 13, N. Y.
National Seal Corp., 14th Ave. & 37th St., Bklyn 18, N. Y.
National Tin Can Mfg. Co., 134 W. 3rd St., New York, N. Y.
National Transparent Plastics Co., 1897 Columbus Ave., Springfield, Mass.
National Waterproofing Co., Front & Lane Sts., Camden, N. J.
National Wholesale Druggists Assn., 330 W. 42nd St., New York, N. Y.
National Wooden Box Assn., 308 Barr Bldg., Washington, D. C.
Naugatuck Chemical, Div. U. S. Rubber Co., 1230 6th Ave., New York 20, N. Y.
Neahr, M. J., & Co., 1600 S. Dearborn St., Chicago, Ill.
Nelson, B. F., Mfg. Co., The, 401 N. E. Main St., Minneapolis 13, Minn.
Neostyle, Inc., 410 N. Wabash Ave., Chicago 22, Ill.
Neumann, Robert, Co., The, 1910-12 W. Eighth St., Cincinnati, Ohio
Nevins-Church Press, The, 250 Park Ave., New York, N. Y.
Newark Boxboard Co., Newark, N. J.
Newark Glassine Bag Co., 44 Jelliff Ave., Newark, N. J.
Newark Paper Box Co., 216 High St., Newark, N. J.
Newark Paraffine & Parchment Paper Co., 50 Jelliff Ave., Newark 8, N. J.
New Can Co., Inc., The, 200 Commercial St., Molden, Mass.
New England Box Co., 173 Main St., Greenfield, Mass.
New England Card & Paper Co., Inc., 22 Hanover St., Springfield, Mass.
New England Collapsible Tube Co., 3132 S. Canal St., Chicago, Ill.
New England Novelty Co., 98 Adams St., Leominster, Mass.
New Haven Pulp & Board Co., 295 East St., New Haven, Conn.
New Jersey Machine Corp., 16th St. at Willow Ave., Hoboken, N. J.
New Products Corp., North Shore, Benton Harbor, Mich.
Newton Carton, 27 Haynes Ave., Newark, N. J.
New York Laminating Co., 60 Woolsey St., Irvington, N. J.
New York Testing Laboratories, 80 Washington St., New York, N. Y.
Niagara Insul-Bake Specialty Co., Inc., 483-493 Delaware Ave., Albany, N. Y.
Niagara Lithograph Co., 1050 Niagara St., Buffalo, N. Y.
Nickelson, John, 155-17 Sanford Ave., Flushing, N. Y.
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Niemand Bros., Inc., 37-01-37-19 35th Ave., Long Island City, N. Y.
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O

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P

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Packaging Machinery Mfrs. Inst., 342 Madison Ave., New York, N. Y.
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Paper Bag Mfrs. Inst., 369 Lexington Ave., New York, N. Y.
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Sherman Paper Products Corp., 156 Oak St., Newton Upper Falls 64, Mass.
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Bold-face listings indicate advertisers in this issue. *(See pp. 956–957)*

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Advertisers' Index

★ ★ ★ ★ ★

A B C Packaging Machine Co. 720
Ace Carton Corp. 178
Acme Folding Box Co. 212
Acme Steel Co. 822–823
Advertising Metal Display Co. 878
Aluminum Company of America 446–447
American Coating Mills Inc. 201
American Machine & Foundry Co. 745
American Paper Goods Co., The 290
American Resinous Chemical Corp. 410
Amsco Packaging Machinery, Inc. 731
Anchor Hocking Glass Corp. 564–565
Arabol Manufacturing Co., The 364
Arenco Machine Co., Inc., The 747
Aridor Co., The 570
Armstrong Cork Co. 566–567
Arrow Manufacturing Co., Inc. 176–177
Art Tube Co. 505
Atlantic Gummed Paper Corp. 370

Bagpak, Inc. 283, 757
Bareco Oil Co. 827
Battle Creek Bread Wrapping Machine Co. 756
Berles Carton Co., Inc. 190
Betner Co., Benj. C. 284
Better Packages, Inc. 820, 831
Bingham Brothers Co. 372
Boonton Molding Co. 600
Braun Co., W. 556
Bridgeport Moulded Products Inc. 627
Brockway Glass Co., Inc. 569
Brooks & Porter, Inc. 203
Brown Bag Filling Machine Co. 758
Burt Co., Inc., F. N. 168–169
Butterfield-Barry Co., Inc., The 198

Cambridge Paper Box Co. 207
Cameo Die & Label Co. 323
Celanese Plastics Corp. 286–287, 468–469, 602–603
Celluplastic Corp. 615
Celon Co., The 572
Champion Paper & Fibre Co., The 231, 232
Champlain Co., Inc., Sub. of the Fred Goat Co., Inc. 751
Chase Bag Co. 298
Chaspec Manufacturing Co. 879
Chisholm-Ryder Co. 734
Claremont Waste Manufacturing Co. 241–244
Clark Co., Inc., George V. 512
Cleaveland Laboratories & Manufacturing Co. 409
Cleveland Container Co., The 500–501
Colt's Patent Fire Arms Manufacturing Co. 614
Colton Co., Arthur 754
Consolidated Packaging Machinery Corp. 739
Continental Can Co. 507
Cottonluxe Manufacturing Co. 288
Creative Printmakers Group 249
Criterion Paper & Twine Co. 475
Crown Can Co. 499
Crown Cork & Seal Co. 552–553
Cupples-Hesse Corp. 291

Davison Chemical Corp., The 833
DeJonge & Co., Louis 253, 254
Dennison Manufacturing Co. 325
Dewey & Almy Chemical Co. 554
Dexter Folder Co. 723–730
Diagraph-Bradley Stencil Machine Corp. 836
Dobeckmun Co., The 449
Dow Chemical Co., The 619–626
DuPont Cel-O-Seal 551
Durez Plastics & Chemicals Inc. 601

Eastman Kodak Co. 612–613
Economic Machinery Co. 707
Equitable Paper Bag Co., Inc. 296
Eureka Manufacturing Co., Inc. 293
Ever Ready Label Corp. 330
Exact Weight Scale Co., The 701

Ferguson Co., J. L. 700
Findley Co., The F. G. 362
Fitchburg Paper Co. 459
Flood & Conklin Manufacturing Co. 408
Floquil Products, Inc. 824
Fontaine Products Co. 617
Forbes Lithograph Co. 876
Fort Orange Paper Co. 195
Foxon Co., The 327, 328
Freydberg Bros.-Strauss, Inc. 250

Gair Co., Inc., Robert 832
Gardner-Richardson Co., The 184–185
Gaylord Container Corp. 835
General Electric Co. 611
General Felt Products Div. of Standard Cap & Seal Corp. 465
George & Sherrard Paper Co. 283
Glass Industries, Inc. 561
Goat Co., Inc., Fred 751
Goodyear Tire & Rubber Co., Inc. 456–457
Gordon-Lavin Paper Box Co., Inc. 180
Great American Plastics Co., The 616
Guardian Safety Seal Co. 550

Hampden Glazed Paper & Card Co. 245, 246
Harris-Seybold-Potter Co. 735
Hayssen Manufacturing Co. 714
Hazel-Atlas Glass Co. 548–549
Hazen Paper Co. 233, 234
Heaphy Co., Charles F. 461, 462
Heat Seal-It Co. 741
Heminway Corp. 191–194
Hercules Powder Co. 609, 610
Hinde & Dauch 825
Horix Manufacturing Co. 712, 722
Hudson-Sharp Machine Co. 705, 721
Humitube Manufacturing Co. 289

Industrial Tape Corp. 365, 366
Inland Container Corp. 830
Interchemical Corp. 90
International Paper Box Machine Co., The 706

International Paper Co., International Paper Products Div.. 283
International Plastic Corp. 373
International Printing Ink Corp. 90
Ivers-Lee Co. 91

Jaypaco Co. 460
Jones & Laughlin Steel Corp. 506

Kalamazoo Vegetable Parchment Co. 440
Keller-Dorian Corp. 453
Kidder Press Co., Inc. 698
Kimberly-Clark Corp. 828–829
Kimble Glass Co. 555
Kindred, MacLean & Co., Inc. 877
Knowlton Co., M. D. 716
Kupfer Bros. Co. 247

Lamson Corp. 738
Lebanon Paper Box Co. 196
Levey Co., Inc., Frederick H. 92
Lowe Paper Co. 175
Lusteroid Container Co., Inc. 618
Lynch Mfg. Corp. 748–749

Mack Molding Co. 607
Manhattan Paste & Glue Co., Inc. 368
Marathon Corp. 179
Marvellum Co., The 251, 252
Mason Box Co., The 187
Matthias Paper Corp. 239, 240
McLaurin-Jones Co. 448
Mehl Manufacturing Co. 821
Meisel Press Manufacturing Co. 736
Mercer-Robinson Co., Inc. 740
Michigan Carton Co. 172
Middlesex Products Corp. 238
Miller & Miller 322
Miller Co., Inc., Walter P. 200
Miller Wrapping & Sealing Machine Co. 744
Milprint Inc. 443
Modern Packaging Magazine 174, 248, 470, 568, 752, 880
Modern Plastics Magazine 463
Monsanto Chemical Co. 604–605
Morris Paper Mills 206
Mundet Cork Corp. 562
Munson Bag Co., The 297

Nashua Gummed & Coated Paper Co. 455
National Adhesives 363
National Collapsible Tube Co. 510
National Color Printing Co., Inc. 324
National Folding Box Co. 173
National Transparent Box Co. 606
Neostyle, Inc. 285
Newark Paraffine & Parchment Paper Co. 441
New England Collapsible Tube Co. 502
New Jersey Machine Corp. 710
Niemand Bros. Inc. 498
Norwood Engineering Co., The 704

Ohio Boxboard Co., The 183
Old Dominion Box Co. 209
Oliver Machinery Co. 742
Oneida Paper Products, Inc. 294
Owens-Illinois Glass Co. 557–560

Package Machinery Co. 708–709
Paisley Products Inc. 371
Palm Bros. Decalcomania Co., The 329
Palm, Fechteler & Co. 326
Palmer, Inc., Frank D. 755
Peerless Tube Co. 514
Pennsylvania Glass Products Co. 563
Peters Machinery Co. 699
Peterson Bros. 202
Pilliod Cabinet Co. 204
Plastics Catalog 374, 463
Pneumatic Scale Corp., Ltd. 702–703
Port Huron Sulphite & Paper Co. 464

Ralston Co., Inc., W. 444
Rathbun Molding Corp. 628
Rayon Processing Co. of Rhode Island, Inc. 237
R. C. Can Co. 504
Redington Co., F. B. 733
Reynolds Metals Co. 471–474
Richardson-Taylor Globe Corp., The 197
Riegel Paper Corp. 442
Rogers Paper Mfg. Co. 208
Ross & Co., A. H. 713
Rowell Co., Inc., E. N. 189
Royal & Co., Thomas M. 282

Salwen Paper Co., Joe 460
Sav-Way Industries 718–719
Scandia Manufacturing Co. 732
Sealright Co., Inc., The 508
Sefton Fibre Can Co. 513
Shaw-Randall Co. 211
Shellmar Products Co. 450–451
Sherman Paper Products Corp. 874
Shoup-Owens Inc. 199
Simplex Paper Box Corp. 188
Smith Co., S. K., The 171
Standard-Knapp Corp. 717
Stock Mold Book 256
Stokes & Smith Co. 711
Sun Tube Corp. 509
Sutherland Paper Co. 205
Sweetnam Inc., George H. 826
Sylvania Industrial Corp. 476, 571

Taber Instrument Corp. 737
Tech-Art Plastics Co. 608
Thilmany Pulp & Paper Co. 452
Toledo Scale Co. 746
Traver Corp. 445
Triangle Package Machinery Co. 715
Twitchell Inc., E. W. 458

Union Bag & Paper Corp. 292
Union Paste Co. 367
U. S. Automatic Box Machinery Co., Inc. 743
U. S. Bottlers Machinery Co. 753
U. S. Envelope Co. 295
U. S. Printing & Lithograph Co., The 181, 321, 875
Universal Jewelry Case Co. 186

Victor Metal Products Corp. 503
Voss Corp., Karl 210

Waldron Corp., John 750
Warner Bros. Co., The 170
Warren Co., S. D. 466–467
Waterbury Companies, Inc., Plastics Div. 182
Westfield River Paper Co., Inc. 454
Whaling Distributing Corp. 834
Wheeler-Van Label Co. 320
Williams & Co., Inc., Charles W. 255
Williamson Adhesives Inc. 369
Wirz Inc., A. H. 511
Wyomissing Glazed Paper Co. 235, 236

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PACKAGING CATALOG

PUBLISHED BY PACKAGING CATALOG CORPORATION

122 EAST 42nd STREET NEW YORK 17, N. Y.

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Printed by Isaac Goldmann Company, New York, N. Y.
Cover and binding by National Publishing Company, Philadelphia, Pa.

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